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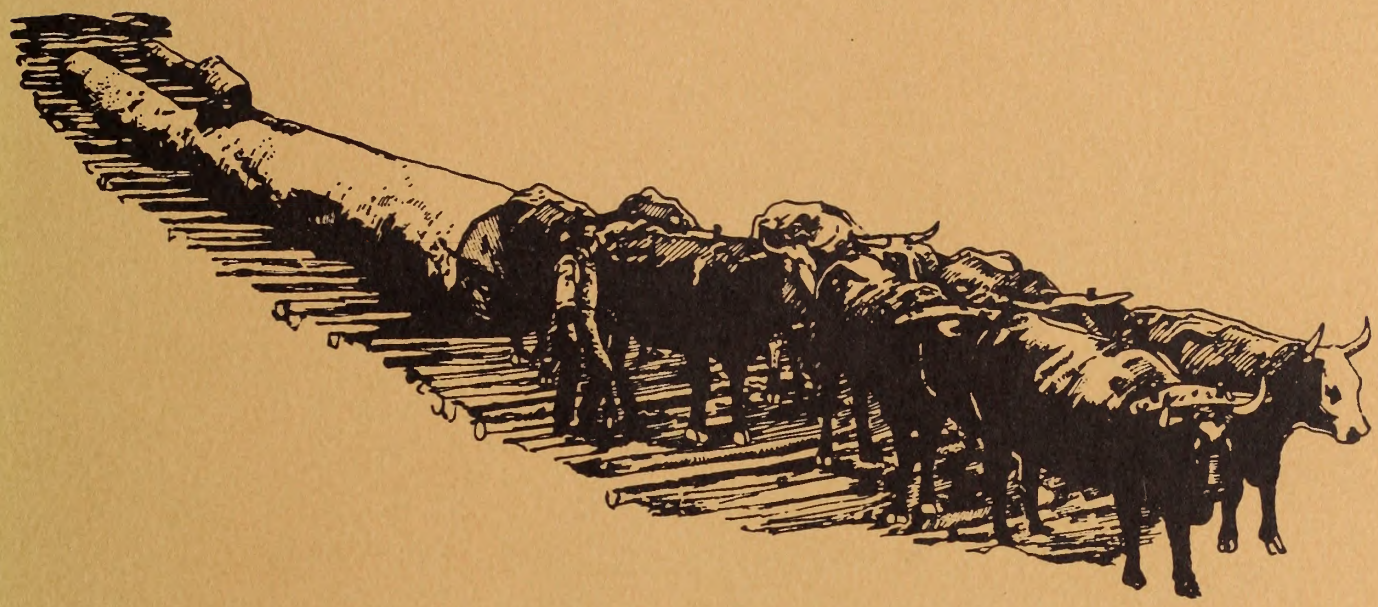

Draft

Timber Management Environmental Impact Statement

Oregon State Office

U.S. DEPARTMENT OF THE INTERIOR
March 3, 1849

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OREGON STATE OFFICE
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Portland, Oregon 97208

Enclosed for your review and comment is the Westside Salem Timber Management Draft Environmental Impact Statement (DEIS). The statement analyzes the impacts which would result from the proposed timber management plan and 10 alternatives. The purpose of the statement is to disclose the probable environmental impacts and to assure that these impacts are considered along with economic, wildlife, technical and other considerations in the decisionmaking process. In using this analysis, readers should keep in mind that an EIS (draft or final) is not the decision document. The decisionmaking process is described in Chapter 1, Implementation Section, in this draft EIS.

Comments concerning the adequacy of this statement will be considered in the preparation of the final environmental impact statement. The comment period will end September 9, 1981. Oral and/or written testimony will be accepted at public hearings which will be held at 1:00 and 7:00 p.m., August 25, 1981, at the BLM district office, 1717 Fabrey Road in Salem, Oregon.

This draft may be incorporated into the final EIS by reference only. The final EIS then would consist of public comments and responses and any needed changes of the draft. Therefore, please retain this draft EIS for use with the final.

Comments received after the close of the comment period will be considered in the decision process, even though they may be too late to be specifically addressed in the final environmental impact statement.

Your comments on the EIS should be sent to the Salem District Manager, in care of the State Office team which prepared the statement. Please address all comments:

Salem District Manager
c/o EIS Team (922)
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97221

Sincerely yours,

William G. Leavell

State Director

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DEPARTMENT OF THE INTERIOR

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

WESTSIDE SALEM SUSTAINED YIELD UNITS

TEN-YEAR TIMBER MANAGEMENT PLAN

Prepared by

BUREAU OF LAND MANAGEMENT

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WESTSIDE SALEM PROPOSED TIMBER MANAGEMENT

Draft (x) Final ( ) Environmental Impact Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ( )

2. Abstract: This EIS describes and analyzes the environmental impacts of implementing an updated 10-year timber management plan for the 244,059 acres of public land in the Columbia and Alsea-Rickreall Sustained Yield Units on the westside of the Salem District, Oregon. The Bureau of Land Management is responsible for managing timber on public lands under the principle of sustained yield consistent with the protection of other resources. Eleven alternatives including a proposed action are described and analyzed for environmental impacts. The proposed action, the result of Bureau multiple use planning using public input, is the preferred alternative. Other alternatives analyzed include: 1) maximum timber production, 2) strong emphasis on timber production, 3) emphasis on timber production, 4) emphasis on non-timber values, 5) strong emphasis on wildlife and other non-timber values, 6) lower average minimum harvest size, 7) higher average minimum harvest size, 8) no control of competing vegetation with herbicides, 9) no allowable cut effect and 10) no action. Specific timber management components of the proposed action and alternatives include road construction, timber harvest, site preparation, reforestation, plantation protection, precommerical thinning, fertilization, and control of competing vegetation. Environmental impacts of the proposed action include wildlife habitat modification, reduced timber harvest, altered stream flow, and reduced soil erosion and stream sedimentation.

3. The draft statement is expected to be filed with EPA and made available to the public on July 10, 1981. The comment period will be 60 days following transmittal to EPA.

4. For further information contact:

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Bureau of Land Management
Oregon State Office
P.O. Box 2965
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TABLE OF CONTENTS

	SUMMARY	xiii
CHAPTER 1	DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION	1-1
	PURPOSE OF AND NEED FOR THE ACTION	1-1
	PROPOSED ACTION AND ALTERNATIVES	1-3
	The Proposed Action	1-7
	Alternative 1 - Maximum Timber Production	1-7
	Alternative 2 - Strong Emphasis on Timber Production	1-8
	Alternative 3 - Emphasis on Timber Production	1-8
	Alternative 4 - Emphasis on Non-Timber Values	1-8
	Alternative 5 - Strong Emphasis on Wildlife and other Non-Timber Values	1-8
	Alternative 6 - Lower Average Minimum Harvest Size	1-9
	Alternative 7 - Higher Average Minimum Harvest Size	1-9
	Alternative 8 - No Control of Competing Vegetation with Herbicides	1-10
	Alternative 9 - No Allowable Cut Effect	1-10
	Alternative 10 - No Action (No Change)	1-10
	FOREST MANAGEMENT TREATMENTS AND DESIGN ELEMENTS	1-11
	Transportation System	1-12
	Timber Harvest	1-13
	Site Preparation	1-13
	Planting	1-14
	Plantation Protection	1-16
	Plantation Maintenance and Release	1-16
	Precommercial Thinning	1-17
	Fertilization	1-17
	COMPARISON OF IMPACTS	1-18
	IMPLEMENTATION	1-18
	Final Decisions	1-18
	Monitoring and Studies	1-21
	Requirements for Further Environmental Assessments	1-21
	INTERRELATIONSHIPS	1-22
	Federal Agencies	1-22
	State and Local Governments	1-23
CHAPTER 2	AFFECTED ENVIRONMENT	2-1
	GEOLOGY AND TOPOGRAPHY	2-1
	CLIMATE	2-1
	AIR QUALITY	2-2
	SOILS	2-3
	WATER RESOURCES	2-9
	VEGETATION	2-15
	Terrestrial Vegetation	2-15
	Wetland and Aquatic Vegetation	2-16
	Sensitive, Threatened and Endangered Plants	2-17

ANIMALS 2-17
Terrestrial Animals 2-17
Fish 2-21
Threatened and Endangered Animals 2-22
RECREATION 2-24
CULTURAL RESOURCES 2-26
Archeologic Sites 2-26
Historic Sites 2-26
Paleontologic Sites 2-27
VISUAL RESOURCES 2-27
WILDERNESS VALUES 2-28
AREAS OF CRITICAL ENVIRONMENTAL CONCERN 2-28
SPECIAL AREAS 2-34
SOCIOECONOMIC CONDITIONS 2-34
Timber Industry 2-39
Fisheries 2-39
Terrestrial Wildlife 2-43
General Recreation 2-43
Public Finances 2-45
Local Income Attributable to BLM-Administered Lands 2-45
Social Concerns 2-45

CHAPTER 3 ENVIRONMENTAL CONSEQUENCES 3-1
INTRODUCTION 3-1
IMPACTS ON AIR QUALITY 3-2
IMPACTS ON SOILS 3-4
IMPACTS ON WATER RESOURCES 3-7
IMPACTS ON VEGETATION 3-12
Terrestrial Vegetation 3-12
Threatened or Endangered Plants 3-15
Conclusions 3-15
IMPACTS ON ANIMALS 3-16
Terrestrial Vertebrates 3-16
Fish 3-25
Threatened and Endangered Animals 3-27
Conclusions 3-28
IMPACTS ON RECREATION 3-31
Conclusions 3-34
IMPACTS ON CULTURAL RESOURCES 3-34
Conclusions 3-37
IMPACTS ON VISUAL RESOURCES 3-37
Conclusions 3-39
AREAS OF CRITICAL ENVIRONMENTAL CONCERN 3-4
SPECIAL AREAS 3-4
IMPACTS OF HERBICIDES ON HUMAN HEALTH 3-42
IMPACTS ON ENERGY USE 3-43
IMPACTS ON SOCIOECONOMIC CONDITIONS 3-45
Short-Term Economic Impacts 3-45
Long-Term Economic Impacts 3-51
Cumulative Economic Impacts 3-54
Other Social Impacts 3-56

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

LIST OF PREPARERS

APPENDICES
GLOSSARY
REFERENCES CITED
INDEX

Tables

1-1 Land Jurisdiction in Acres by County within Westside Salem Sustained Yield Units 1-3
1-2 Comparison of Proposed Action and Alternatives by Treatment - First Decade 1-5
1-3 Derivations of Timber Production Base Acreage 1-6
1-4 Estimated Ten-Year Use of Herbicides Based on Proposed Action Acreage 1-15
1-5 Summary of Impacts 1-19
1-6 Relationship of the Proposed Action and Alternatives to the Basic Objectives of the Forestry Program for Oregon 1-27
1-7 Relationship of Westside Salem Proposed Action and Alternatives to LCDC Statewide and Coastal Goals. 1-25

2-1 Air Quality 2-3
2-2 Soils of the WSSYUs 2-4
2-3 Water Resources 2-10
2-4 Existing Forest Habitat Stratification of Entire North Coast Area 2-16
2-5 Sensitive Species Currently Under Review for Possible Listing 2-18
2-6 Habitat Structure of Forest Lands in the SYUs 2-19
2-7 Habitats of the WSSYUs 2-20
2-8 Coldwater Fish Habitat and Populations 2-22
2-9 Threatened and Endangered Species of the WSSYUs 2-23
2-10 Rivers Identified by the HCRS in the Nationwide Rivers Inventory.. 2-25
2-11 Estimated Current and Projected Visitation Attributed to Major Recreational Activities 2-25
2-12 Nominated and Proposed Areas of Critical Environmental Concern ... 2-33
2-13 Population, 1960-1980 2-35
2-14 Labor Force and Employment, Average 1976-1979 2-36
2-15 Personal Income and Labor and Proprietors' Income, 1976-67 2-38
2-16 Earnings and Employment Generated by the Timber Industry 2-40
2-17 Employment and Earnings Generated by BLM Timber Harvest 2-41
2-18 Local Income and Employment Generated by the Commercial Fishery and the Trip Expenditures of Sport Anglers 2-42
2-19 Local Income and Employment Generated by Hunting Activity, 1975 and 1990 2-44

2-20 Local Income and Employment Generated by General Recreation Activity, 1975-1990 2-44
2-21 O&C Revenue Distribution to Counties Expressed as Property Tax Rate Equivalent and as Percent Supplement to Local Levy, Fiscal Years 1977-1980 2-46
2-22 Changes Desired by Survey Respondents in the Use of Federal Lands 2-47

3-1 Components of Smoke from Slash Burning 3-3
3-2 A Comparison of Compacted and Bared Soil Resulting from Yarding System 3-5
3-3 Erosion on BLM Lands in the SYUs During the Ten-Year Management Plan 3-6
3-4 Changes in Sedimentation 3-8
3-5 Municipal Watersheds and Planned Harvests 3-10
3-6 Possible Nitrogen Entering Streams from Slash Burning 3-11
3-7 Approximate Acres of BLM-Administered Timber Lands and Percent of Change After One Decade 3-14
3-8 Acres of Old Growth on BLM-Administered Lands Remaining at End of Each Decade for Proposed Action and All Alternatives 3-18
3-9 Estimated Elk Population Changes on BLM Lands 3-29
3-10 Abundance of Salmonids as a Percent of Optimum 3-30
3-11 Potential Impacts of the Sample Five-Year Timber Sale Plan on Recreation Sources 3-33
3-12 Estimated Recreational Visitation 3-35
3-13 VRM Class Changes 3-38
3-14 Potential Impacts of the Sample Five-Year Timber Sale Plan on Visual Resources 3-40
3-15 Estimated Annual Energy Consumption Attributable to the Proposal and Alternatives 3-44
3-16 Short-Term Impacts Compared to Existing Condition on Local Employment and Earnings Related to Timber Harvest 3-47
3-17 Short-Term Impacts Compared to No Action Condition on Local Employment and Earnings 3-48
3-18 Short-Term Impacts Compared to Existing Condition on Local Employment and Earnings Related to Fisheries, Hunting and Other Recreation 3-50
3-19 Short-Term Impacts Compared to Existing Condition on Local Employment and Earnings Related to Fisheries, Hunting and Other Recreation 3-50
3-20 Short-Term Impacts Compared to Existing Condition on O&C Revenue Distribution 3-52
3-21 Short-Term Impacts Compared to No Action Condition on O&C Revenue Distribution 3-53

Figures

Vicinity Map xii
1-1 WSSYU - EIS Area ..... Inside Back Pocket

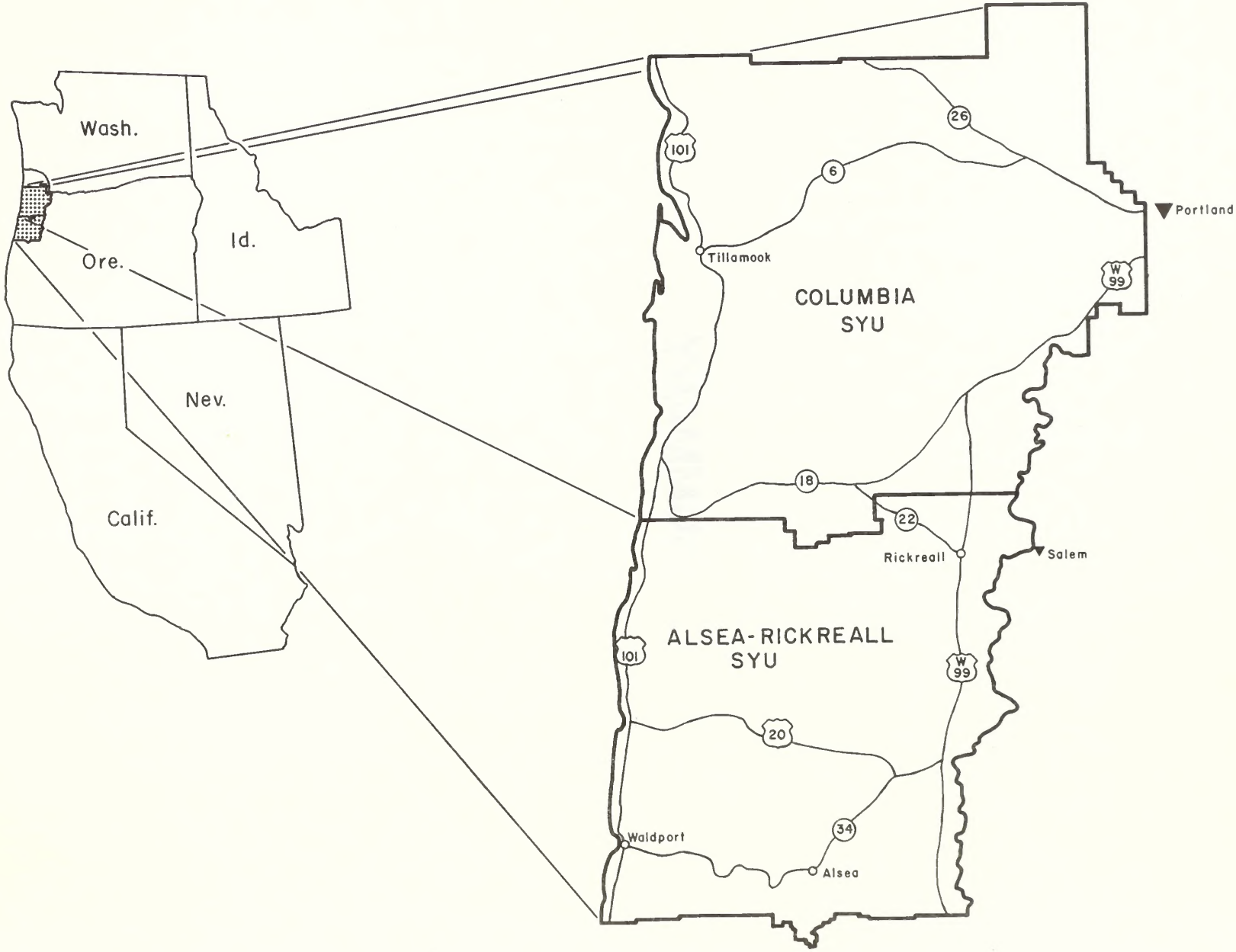
2-1 Soils 2-5
2-2 Relief and Major Watersheds 2-11
2-3 River Basins 2-13
2-4 Visual Resource Management 2-29

3-1 Forest Management by Action by Decade: Proposed Action 3-21
3-2 Timber Sales and Harvest WSSYUs 1971-1980 3-46
3-3 Comparison of Minimum Harvest Sizes 3-55

SUMMARY

VICINITY MAP

WESTSIDE SALEM SYUS



SUMMARY

Introduction

This environmental impact statement (EIS) describes and analyzes the environmental impacts of implementing an updated 10-year timber management plan for the Columbia and Alsea-Rickreall Sustained Yield Units in the Salem District, Oregon. Hereafter, the Columbia and Alsea Rickreall Sustained Yield Units will be referred to as Westside Salem Sustained Yield Units (WSSYUs, SYUs). This EIS applies to the 244,059 BLM-administered acres within the combined SYUs. These are primarily revested Oregon and California Railroad (O&C) lands.

In accordance with the National Environmental Policy Act, this EIS identifies impacts on the natural and human environment associated with the proposed action and alternatives. The proposed action, developed through the Bureau planning system using public input, is the preferred alternative. Ten other alternatives have been identified, described and analyzed to provide a wide range of options for review and consideration.

Alternatives including the Proposed Action

Under all alternatives, intensive timber management treatments would include construction of logging roads, brush field and hardwood stand conversion, site preparation with burning and herbicide application, planting coniferous trees (including genetically improved stock), animal damage control, plantation maintenance and release with herbicides or manual means, precommercial thinning and fertilization.

Variables among alternatives include amounts of land allocated to timber production, types and amounts of intensive management practices and constraints on timber harvest to benefit other resource values.

Timber harvest under all alternatives would be accomplished predominately by clearcutting, with some single tree selection for mortality salvage. There is no surplus inventory, thus none can be made available for accelerated harvest in accordance with Departmental policy. In all alternatives except 1, 5, 6, 7 and 10, the minimum average diameter of trees available for final harvest would be 17 inches diameter breast height (dbh), normally reached in 60 years. The proposed alternatives are:

Proposed Action (Preferred Alternative). This alternative would result in an annual timber sale program of 149 MM bd. ft. which includes a hardwood timber harvest. A minimum time constraint of 10 years before harvest of adjacent clearcut units would be applied when possible. Protection of riparian zones to benefit water quality, fish and wildlife would be provided. Retention of existing old-growth forest and management for unique and special wildlife habitats are included in this alternative. Habitat protection for bald eagle nesting areas would be included. Areas with highly scenic, recreational and critical environmental values would be protected through preservation or special management techniques.

1. Maximum Timber Production. This alternative would produce an annual timber sale program of 190 MM bd. ft. including a hardwood timber harvest. Except for protection of one known bald eagle nesting area, and existing recreation and progeny test sites, all commercial forest land would be allocated to intensive timber production. Timber stands available for harvest would have an average size of 15 inches dbh, normally reached in 50 years. This alternative would provide stream buffers consistent with the Oregon Forestry Practices Act, however, protection for riparian zones, other wildlife habitat, visual and other resouce values would not be provided.

2. Strong Emphasis on Timber Production. This alternative would produce an annual timber sale program of 176 MM bd. ft. including a hardwood timber harvest. In addition to the level of resource protection provided in Alternative 1, areas identified as fragile or reforestation problem sites would be withdrawn from the intensive timber base. Existing recretion sites and two designated outstanding and research natural areas would be retained.

3. Emphasis on Timber Production. Under this alternative, all resources would receive the same emphasis as the proposed action except for wildlife and recreation. There would be fewer acres for recreation lands, and protection of old-growth habitat would be limited to that necessary to support one pair of bald eagles and seven northern spotted owl pairs. The annual timber sale program would be 163 MM bd. ft. including a hardwood timber harvest.

4. Emphasis on Non-Timber Values. This alternative would produce an annual timber sale program of 141 MM bd. ft. including a hardwood timber harvest. Wildlife habitat corridors would be established to maintain portions of BLM-administered forest in all age classes to assure the continuation of existing animal communities and to prevent genetic isolation. All other management practices and constraints would remain the same as described in the proposed action.

5. Strong Emphasis on Wildlife and Other Non-Timber Values. Under this alternative, a full ecosystem approach would be used to provide wildlife habitat diversity. Designated areas would be managed to produce and maintain large and small blocks of old-growth and mid-age forest habitat. These areas would be distributed over the entire SYUs rather than confined to corridors as in Alternative 4. Timber stands available for harvest would have an average size of 19 inches dbh, normally reached in 70 years. All other resource management practices and constraints would remain the same as the proposed action. The annual timber sale program, including a hardwood component, would be 99 MM bd. ft.

6. Lower Average Minimum Harvest Size. This alternative is identical to the proposed action except for a lower average minimum harvest size. Timber stands available for final harvest would have an average minimum size of 15 inches dbh, normally reached in 50 years. This would result in an estimated annual timber sale program of 155 MM bd. ft. including a hardwood timber harvest.

7. Higher Average Minimum Harvest Size. This alternative is identical to the proposed action except for a larger average minimum harvest size. Timber stands available for final harvest would have an average minimum size of 19 inches dbh, normally reached in 70 years. This would result in an estimated annual timber sale program of 140 MM bd. ft. including a hardwood timber harvest.

8. No Control of Competing Vegetation with Herbicides. This alternative is the same as the proposed action except that herbicides would not be used to control grass, brush and hardwood species growing in competition with commercial coniferous tree species. Control of vegetation for timber management by burning, grazing or using mechanical or manual means would be prescribed where economically feasible. This would result in an estimated annual timber sale program of 146 MM bd. ft. including a hardwood timber harvest.

9. No Allowable Cut Effect. The allowable cut base, management practices and constraints in the proposed action are used for this alternative. The difference is that credit for expected yields from intensive timber management practices (genetically improved stock, fertilization, precommercial and commercial thinnings) would not be taken until gains in tree growth are measured in future inventories. The annual timber sale program would be 114 MM bd. ft. including a hardwood timber harvest.

10. No Action (No Change). This alternative constitutes a continuation of the present allowable cut (156 MM bd. ft.) which, unlike the proposed action, excludes the hardwood timber harvest component. Continuation of the same management practices and constraints used in the 1972 allowable cut calculation is assumed. Minimal protection would be provided for some highly scenic areas, recreation sites and wildlife habitat.

Environmental Consequences

Air Quality

Slash burning for the decade ranges from 14,145 acres under Alternative 5 to 28,331 acres under Alternative 1. Air quality in residential areas could be impacted by particulates up to a distance of 30 to 35 miles from a fire.

Soils

Road construction, yarding, slash burning and any activity that disturbs soil cover increases soil erosion. Erosion is greatest in the first year after disturbance, decreasing in most areas to background levels after 4 to 5 years. Total erosion in the SYUs is closely related to the number of acres disturbed, thus soil erosion would be least for Alternative 5 and greatest for Alternative 1.

Water Resources

Cumulative sediments produced as a result of activities of the proposed action and all alternatives except 1 and 2 would be expected to decrease from levels in the past decade. The range of decrease is from 2 percent for Alternative 3 to 61 percent for Alternative 5. Sediment yield for Alternatives 1 and 2 would increase 17 and 5 percent, respectively, over past decade

levels. The amount of sediment produced depends on factors such as proximity of disturbance to waterways, surface drainage, stream buffer widths, percent slope, climatic events and soil erodibility.

Road building and soil compaction from logging would increase runoff and stream flow. Water yield increases could have a local minor adverse impact but the impact would be negligible to the SYUs as a whole.

Vegetation

Alterations to plant community structure and longevity would be the most significant impacts to vegetation on lands scheduled for timber harvest. Existing older forest communities scheduled for final harvest would be converted to early successional stage communities. Permanent road construction would eliminate vegetation from approximately 1,400 acres.

Animals

In all alternatives, habitat diversity would be reduced during the first decade. In the proposed action and Alternatives 3 through 9, the long-term changes that would occur to wildlife habitat would be beneficial. If Alternatives 1, 2 or 10 were selected, there would be a great decrease in mature and old-growth habitats and those species using those habitats.

Habitat removed by road construction would be permanently and irretrievably lost on roads proposed as part of the permanent road system. Reduced use of habitat by elk and large carnivores within one-half mile of these roads is probable.

In general, cold water fish habitat is expected to continue improving except where design features fail. If Alternatives 1, 2 or 10 were selected, the impacts to fisheries would be significant and adverse.

Increases in water yield could have an adverse impact on fish in small watersheds but a negligible one to the fishery resource in the SYUs as a whole. Water temperatures are not expected to change, except in Alternatives 1, 2 and 10 where no unharvested buffer strips are proposed.

The proposed action would have no known adverse impacts on any species listed by the Federal government as threatened or endangered. The northern spotted owl, listed by the State of Oregon as threatened, would be adversely impacted by Alternatives 1, 2 and 10.

Recreation

The impacts of timber management operations would be both beneficial and adverse, depending on the recreational experience desired. Visitor use increases or reductions may occur in certain areas as a result of impacts to specific recreational experiences.

Impacts would depend upon the approach and emphasis taken to meet recreational needs, degradation of desired recreational experience and effects of forest habitat simplification on recreation-related wildlife populations. Alternatives 1, 2 and 10 have few provisions to meet needs for activities

other than off-road vehicle use, and visitation would be significantly impacted. Area-wide hunting, fishing and wildlife sightseeing use would be adversely impacted most significantly under Alternatives 1, 2 and 10. The proposed action and Alternatives 3 through 9 would adequately meet most recreational needs.

Cultural Resources

Appropriate measures would be taken to identify and protect cultural sites prior to ground-disturbing activities under the proposed action and all alternatives. Undiscovered cultural sites would be susceptible to considerable alteration and damage. Once a site is found, however, mitigation measures will be instituted to minimize or avoid damage.

Under the proposed action and Alternatives 3 through 10, sites discovered before logging would be fully protected. Under Alternatives 1 and 2, only sites determined eligible for the National Register would be protected in place. Appropiate measures for data recovery would be developed for all other cultural sites resulting in an irretrievable loss of some information.

Visual Resources

Alternative 5 provides the highest degree of protection for visual resources. Adverse visual impacts under the proposed action and Alternatives 3, 4 and 6 through 9 would be low. Most highly scenic and/or sensitive areas would be protected. Under Alternative 10, adverse visual impacts would be moderate, and some protection would be provided for certain highly scenic and/or sensitive areas. Adverse visual impacts would be greatest under Alternatives 1 and 2 as the visual resources of only 145 acres would be protected.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACEC) designation would provide guidelines to help achieve resource protection in those areas designated. All alternatives, except 1 and 10, provide some level of ACEC designation greater than the existing situation. Designation ranges from 4 areas (505 acres) under Alternative 2 to 15 areas (11,175 acres) under Alternative 5.

Special Areas

The ecological and biological merits of Table Mountain potential National Natural Landmark would be adversely impacted by timber management operations. Impacts would be most likely under Alternative 1 and least likely under Alternative 5.

Energy Use

Fossil fuel energy would be consumed in all phases of the 10-year timber management plan. The annual energy consumption ranges from .65 trillion Btu's (Alternative 5) to 1.22 trillion Btu's (Alternative 1). The annual energy consumption attributable to the proposed action would be approximately .97 trillion Btu's.

Socioeconomics

Compared to recent economic conditions, the proposed action and all alternatives except 5 and 9 would increase employment in the timber industry and total local employment and earnings. The proposed action would result in an increase of 195 timber industry jobs and 715 jobs in total. The greatest increase in jobs would be the result of Alternative 1, 502 timber industry jobs and 1,562 total. At the other extreme, Alternative 5 would result in a net loss of 179 timber industry jobs and 452 total.

Compared with continuation of the current timber management program, only Alternatives 1, 2, 3 and 6 would have a favorable impact on employment and earnings. In this comparison, the proposed action would result in 55 less timber industry jobs but employment of only 26 less jobs. Alternative 5 would result in 458 less timber industry jobs, and 1,794 less in total. Alternative 1 would result in 274 more timber industry jobs and 821 total.

Compared with 1980 distributions, all alternatives would result in an increase in O&C revenues to counties. Compared with continuation of the current program, the proposed action and Alternatives 4 through 9 would have negative impacts in O&C revenues while Alternatives 1 and 2 would have positive impacts. These impacts vary by county for each of the 18 O&C counties in accordance with its dependence on O&C revenues.

CHAPTER I

DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

CHAPTER 1 DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

PURPOSE OF AND NEED FOR THE ACTION

The Bureau of Land Management (BLM) proposes to implement, beginning October 1, 1982, an updated 10-year timber management plan for the Columbia and Alsea-Rickreall Sustained Yield Units in the Salem District, Oregon (Figure 1-1, folded maps in the back cover pocket). Hereafter, the Columbia and Alsea-Rickreall Sustained Yield Units will be referred to in this document as Westside Salem Sustained Yield Units (WSSYUs, SYUs). These are primarily revested Oregon and California Railroad (O&C) lands. In accordance with the National Environmental Policy Act (NEPA), this EIS identifies impacts on the natural and human environment associated with the proposed action and alternatives. The 10-year timber management plan for the two SYUs provides direction for management of these lands as required by the actions mentioned below.

The Bureau's principal authority and direction to manage the O&C grant lands is found in the O&C Act of 1937 (50 stat. 874; 43 U.S.C. 1181a., et seq.). Under this Act, O&C lands classified as timberlands are to be managed under sustained yield principles in order to provide a permanent source of timber supply, watershed protection, stream flow regulation and recreational facilities. Intermingled public domain lands were brought under sustained yield management principles by the Bureau's 1969 application to withdraw these lands from entry under all public land laws except certain disposal acts. Withdrawal was completed by Public Land Order 5490 (40 FR 7450 (1975)). In addition, many activities of the BLM are governed by the Federal Land Policy and Management Act of 1976 (90 Stat. 2743, 43 U.S.C. 1701). This law, often referred to as FLPMA, established policy for BLM administration of public lands under its jurisdiction.

Notwithstanding any provision of FLPMA, in the event of conflict with or inconsistency between FLPMA and the O&C Act of August 28, 1937 (50 Stat. 874; 43 U.S.C. 1181a-1181j), insofar as they relate to management of timber resources and disposition of revenues from lands and resources, the latter Act shall prevail.

During the planning process, the following criteria were used to evaluate alternatives and select a preferred land-use allocation alternative. The preferred alternative is considered the one which best meets national guidance and most appropriately satisfies all criteria.

- Meet the long-term objective to attain a high level of sustained yield timber production to satisfy regional and national needs.

- Minimize soil loss caused by both management activities and uncontrolled activities (e.g., off-road vehicles).

- Contribute to the improvement or maintenance of water quality in streams, rivers and municipal watersheds, compared to current conditions. Sediment reaching the stream and water temperature changes that occur as a result of management activities was of primary concern.

- Minimize impacts on air quality in residential areas.

- Provide for developed and dispersed recreational opportunities to meet demands related to BLM-administered lands.

- Provide for maintaining the visual quality of the forest landscape in areas of high sensitivity.

- Protect, or improve and develop fish spawning, rearing and migration habitat.

- Protect important wildlife habitat.

- Protect or enhance habitat of threatened or endangered plant and animal species.

- Provide for scientific and educational study through such programs as Research Natural Areas.

- Allow minerals exploration and development while protecting other resource values.

- Allow adequate land allocations for communication sites, access development and designation of right-of-way corridors while protecting other resource values.

- Provide local economic stability through high levels of local employment and personal earnings which are dependent on raw materials, recreation and other use opportunities available on lands administered by BLM.

- Provide for a high level of contribution to local public revenues from resources and activities available on public lands.

- Demonstrate consistency with State planning goals (Land Conservation and Development Commission), acknowledged local comprehensive plans, and officially approved local resource related plans, programs and policies.

- Demonstrate consistency with other Federal resource-related plans, programs, and policies. (Provide coordinated approach to regional issues and projects or proposals crossing administrative lines.)

The alternative land use plans prepared for the SYUs identify various timber harvest levels, management practices and mitigating measures to protect the land and other resources. For purposes of study and comparison between alternatives, the Salem District Manager has recommended a proposed action. The proposed action, the preferred alternative for the purpose of analysis, was developed through the Bureau Planning System using public input. Following a 30-day review and comment period on the final EIS, a draft Decision Document will be prepared and released for public review and comment (See Implementation, Final Decisions).

PROPOSED ACTION AND ALTERNATIVES

Planning for the Westside Salem Sustained Yield Units (WSSYUs) focused on the 244,059 acres administered by BLM. These lands are widely dispersed over portions of Benton, Clatsop, Columbia, Lane, Lincoln, Multnomah, Polk, Tillamook, Washington and Yamhill Counties in an aggregate area of 3,579,092 acres (Table 1-1).

Table 1-1 Land Jurisdiction in Acres 1/ by County within Westside Salem Sustained Yield Units

County	BLM 2/	Other Fed. Gov't.	State	Local Govt.	Private	Total
Benton	47,482	16,498	18,841	11,325	323,273	427,520
Columbia	11,081	855	16,170	10,330	375,004	413,440
Lincoln	20,404	171,205	23,979	8,272	406,540 3/	630,400
Polk	41,673	717	8,708	4,843	417,019	472,960
Tillamook	49,448	95,903	316,082	12,955	239,212	713,600
Washington	12,015	370	53,438	15,632	377,132	458,259
Yamhill	42,702	25,879	1,840	15,632	367,707	453,760
Other Counties 4/	9,153	-	-	-	-	9,153
Total	244,059	311,427	439,058	78,661	2,505,887	3,579,092

1/ Acreage figures for BLM-administered lands are derived from master title plats. Other acreage figures are from Resource Atlases published by O.S.U. Extention Service, 1964.

2/ O&C lands make up 83 percent of the public lands administered by BLM, while the remaining 17 percent are Public Domain lands.

3/ The 3,630 acres of land in Lincoln County (previously administered by BLM) conveyed to the Siletz Indians by the Act of September 4, 1980 is tallied with "private" lands.

4/ Miscellaneous lands in this planning area include: 43 acres in Clatsop County; 617 acres in Multnomah County; and 8,493 acres in Lane County.

Appendix A presents a discussion of the planning process and inventory methods used to arrive at the timber production base, allowable cut determination and other land use allocations. Acreages for land use allocations by alternative are shown in Table A-2.

During the scoping meeting held in Salem (October 28, 1980), the participants were asked to identify issues and alternatives to be addressed in this EIS.

The following discussion includes alternatives identified during scoping and considered appropriate for analysis. Alternatives identified but not considered appropriate for analysis, and the rationale for these determinations, are presented in Appendix B, which summarizes the scoping meeting.

There are 11 alternatives including the proposed action for which impacts will be analyzed in Chapter 3:

Proposed Action (PA)
1. Maximum Timber Production (Max. Tbr.)
2. Strong Emphasis on Timber Production (Str. Tbr.)
3. Emphasis on Timber Production (Emp. Tbr.)
4. Emphasis on Non-Timber Values (Emp. Other)
5. Strong Emphasis on Wildlife and Other Non-Timber Values (Full Eco.)
6. Lower Average Minimum Harvest Size (Lo MHS)
7. Higher Average Minimum Harvest Size (Hi MHS)
8. No Control of Competing Vegetation with Herbicides (No Herb.)
9. No Allowable Cut Effect (No ACE)
10. No Action (No Change)

For each alternative, a sustained yield harvest level (allowable cut) has been calculated based on the timber production base (see Glossary) of the two SYUs combined. All allowable cut computations are made in cubic feet and converted to Scribner board feet equivalence for the first decade. There is no surplus inventory (see Glossary). Thus, none can be made available for accelerated harvest in accordance with Departmental policy. Variables between alternatives include amounts of land allocated to timber production, types and amounts of intensive management practices and constraints on timber harvest to benefit other resource values. These relationships are displayed in Table 1-2. Treatments and design elements used in their accomplishment, as applicable to alternatives, are discussed in the next section of this chapter entitled Forest Management Treatments and Design Elements.

In all alternatives except 1, 5, 6, 7 and 10 the minimum average diameter of trees available for final harvest in the intensive timber production base would be 17 inches diameter breast height, (dbh) normally reached in 60 years. Harvest of stands this size would occur for seven or eight decades during the 400 year projection period (described in Appendix A). The most usual circumstance, as the forest approached a regulated condition, would be a minimum average harvest size of 21 inches dbh, normally reached in 80 years. On areas allocated to constrained timber production, minimum harvest ages (MHA) vary to recognize specific needs for wildlife habitat diversity and visual resource management (VRM) considerations. All harvest levels shown in Table 1-2 are computed on the respective combinations of intensive and constrained timber production bases. Table 1-3 displays the breakdown by category and alternative.

Table 1-2 Comparison of Proposed Action and Alternatives by Treatment - First Decade

	Proposed Action (PA)	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt. 10 No Action
Intensive Timber Production Base 1/	176,208	226,605	203,678	189,307	163,705	140,449	176,208	176,208	176,208	176,208	206,788
Constrained Timber Production Base 1/	2,480	0	0	2,600	19,720	0	2,480	2,480	2,480	2,480	0
Annual Harvest											
Conifer Volume (MM bd.ft.)	146	183	173	160	138	96	152	137	143	111	156
Hardwood Volume (MM bd.ft.)	3	7	3	3	3	3	3	3	3	3	0
Total Million bd. ft.	149	190	176	163	141	99	155	140	146	114	156
Total Million cu. ft.	23.13	29.85	27.24	25.28	21.87	15.28	23.91	21.66	22.66	17.62	24.11
Treatments 2/											
Transportation System (miles;acres)											
New Construction 3/	173;1,384	179;1,432	173;1,384	173;1,384	143;1,144	108;864	173;1,384	173;1,384	173;1,384	173;1,384	173;1,384
Reconstruction	120; 0	120; 0	120; 0	120; 0	120; 0	120; 0	120; 0	120; 0	120; 0	120; 0	120; 0
Timber Harvest (acres)											
Clearcut 4/	22,479	30,047	25,976	24,010	20,871	15,269	23,237	21,102	22,033	17,241	22,594
Shelterwood	220	0	0	214	214	0	220	220	220	220	0
Mortality Salvage	156	625	620	529	425	92	126	170	170	170	0
Commercial Thinning	3,429	3,681	3,623	3,471	2,837	2,402	3,429	3,429	3,429	3,429	7/
Site Preparation (acres)											
Broadcast Burning (slash disposal)	20,726	27,572	23,701	22,027	19,218	14,145	21,370	19,556	19,987	16,274	19,205
Herbicide	5,400	6,572	6,104	5,883	4,838	3,447	5,400	5,400	0	5,400	7/
Manual	300	300	300	300	300	300	300	300	1,340	300	7/
Mechanical	4,300	4,960	4,300	4,300	3,866	2,970	4,300	4,300	4,300	4,300	7/
Stand Conversion (brush & hardwood)	1,010	770	1,220	1,220	1,090	640	1,010	1,010	1,010	1,010	1,500
Planting (acres)											
Initial plant 5/	22,105	29,385	25,812	23,846	20,817	15,045	22,863	20,728	21,659	16,867	22,710
Replant or Interplant	8,400	11,166	9,809	9,061	7,911	5,718	8,688	7,877	8,230	6,409	8,630
Plantation Protection (acres)	9,590	10,470	9,590	9,590	8,699	6,391	9,590	9,590	9,590	9,590	7/
Plantation Maintenance and Release 6/ (acres)	13,700	16,282	15,325	14,166	12,352	9,030	13,700	12,426	4,070	10,121	7/
Precommercial Thinning (acres)	3,581	3,905	3,698	3,559	3,188	3,163	3,581	3,581	3,581	3,581	7/
Fertilization (acres)	4,280	4,669	4,490	4,293	3,615	3,305	4,280	4,280	4,280	4,280	7/

1/ See Glossary
2/ Each treatment is described in detail following description of the alternatives.
3/ Figured at the rate of 8 acres/mile of road including landings.
4/ These include the following Hardwood Clearcut Acres: Under the PA and Alts. 6, 7, 8 and 9 - 1,460 acres; Alt. 1 - 3,946 acres; Alt. 2 - 1,478 acres; Alt. 3 - 1,454 acres; Alt. 4 - 1,354 acres; Alt. 5 - 1,317 acres; and Alt. 10 - 0 acres.
5/ An estimated 14,300 acres would be reforested with genetically-improved seedlings in all alternatives.
6/ An estimated 700 acres would be treated manually under all alternatives except Alternative 8 where manual methods are employed exclusively and Alternative 10.
7/ Alternative 10 contains treatments to the degree necessary to maintain the allowable cut plan implemented in 1972. In fact, levels of commercial thinning and precommercial thinning called for in the 1972 cut calculation are not attainable.

Table 1-3 Derivations of Timber Production Base Acreage

	Alternatives Including the Proposed Action						
	PA, 6,7,8&9	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt.10
INTENSIVE TIMBER PRODUCTION BASE							
Conifer	166,968	203,068	193,927	179,812	154,250	131,982	206,788
Hardwood	9,240	23,537	9,751	9,495	9,455	8,467	0
Total Intensive	176,208	226,605	203,678	189,307	163,705	140,449	206,788
CONSTRAINED TIMBER PRODUCTION BASE							
VRM II (MHA-100)	2,480	0	0	2,600	2,560	0	0
Wildlife (MHA-350)	0	0	0	0	17,160	0	0
TOTAL CONSTRAINED	2,480	0	0	2,600	19,720	0	0
TOTAL TIMBER PRODUCTION BASE 1/	178,688	226,605	203,678	191,907	183,425	140,449	206,788

1/ Refer to Land Use Allocation, Appendix A, Table A-2

The Proposed Action

The timber sale program for the 10-year timber management plan would include a hardwood timber harvest program (see Table 1-2). A minimum time constraint of 10 years before harvest of adjacent clearcut units would be applied when possible, however, the average time constraint is expected to be 5 to 7 years. The proposal incorporates protection of riparian zones to benefit water quality and fish production as well as habitat for many other wildlife species using riparian areas. Riparian zones would be protected on all third order and larger streams and all second order streams with water diversions and/or fish.

The wildlife habitat management component focuses on retaining 11,800 acres of the existing old-growth forest (see Chapter 2, Wildlife). Management is also provided for unique and special habitats (e.g., meadows, cliffs, etc.) as well as snags and hardwoods for their wildlife values. Habitat for one known bald eagle nesting area and any additional eagle nests which may be found, would be provided.

Objectives for visual resource management of all public lands would be established. Special harvest constraints for VRM Class II lands (see Chapter 2) would protect certain highly scenic and/or visually sensitive resource values. Proposed Areas of Critical Environmental Concern (see Chapter 2) would be protected from those actions which could significantly affect their important or relevant resource values. Additional areas and facilities would be provided to meet projected recreational needs (Table 2-11).

Alternative 1 - Maximum Timber Production

Except for the protection of known Federally-listed threatened and endangered species (one bald eagle nest site), and existing recreation and progeny test sites (Glossary), all commercial forest land would be allocated to the intensive timber production base (Table A-2). The annual timber sale program would include a hardwood timber harvest component (Table 1-2). Timber stands available for harvest would have an average size of 15 inches dbh, normally reached in 50 years. Harvest at this size would occur from the 7th through 13th decades during the 400-year projection period.

Given the current lack of research data on reforestation of fragile and problem sites, it is assumed that the 8,800 acres identified under other alternatives as fragile and reforestation problem sites would be removed from the intensive timber base upon harvesting. Although some type of vegetation would be expected to develop on most acres, the length of time and species composition remain unknown and future harvest cannot be predicted.

This alternative would provide stream buffers consistent with the Oregon Forest Practices Act; however, protection for riparian zones, northern spotted owls, other wildlife habitat, visual and other resource values would not be provided.

Alternative 2 - Strong Emphasis on Timber Production

This alternative would include a hardwood timber harvest component in the annual timber sale program (Table 1-2). In addition to the level of resource protection (bald eagles, recreation sites and progeny test sites) provided in Alternative 1, areas identified as fragile or reforestation problem sites would be withdrawn from the intensive timber base (Table A-2). Under this alternative there would be no commercial forest land allocated for visual resource management or for specific management of habitat for wildlife other than eagles. Existing recreation sites and two designated outstanding and research natural areas would be retained.

Alternative 3 - Emphasis on Timber Production

Under this alternative, all resources would receive the same emphasis as the proposed action except for wildlife and recreation (Table A-2). There would be less emphasis on recreational values and fewer acres allocated for recreation lands. Protection of old-growth habitat would be limited to that necessary to support seven northern spotted owl pairs in accordance with the Oregon Endangered Species Task Force recommendations (300 acre core area, 1978) and one pair of bald eagles. The annual timber sale program would include a hardwood timber harvest (Table 1-2).

Alternative 4 - Emphasis on Non-Timber Values

This alternative differs from the proposed action in that non-timber resource values would receive more emphasis. The annual sale program would include a hardwood harvest component (Table 1-2).

Wildlife habitat corridors would be established to maintain portions of BLM-administered forest in mid-age and old-growth stands and to provide a diversity of habitats that would ensure the continuation of the existing animal communities and prevent genetic isolation. Large areas (1,920 acres) containing 640 acres of old growth and small areas (240 acres) containing 80 acres of old growth would be maintained in a series of corridors. The remainder of the large (1,280 acres) and small (160 acres) areas would consist of younger replacement stands (see Appendix C). The large, small and younger-aged replacement blocks in the corridor are contained in the constrained timber production base (MHA-350) shown in Table 1-3. During the first 10 years under this alternative, 78 acres of these blocks could be harvested. However, no timber harvest would be scheduled within elements of the corridor system until detailed plans have been developed. All other management practices and constraints would be the same as described in the proposed action.

Alternative 5 - Strong Emphasis on Wildlife and Other Non-timber Values

Under this alternative, a full ecosystem approach would be utilized to provide wildlife habitat diversity. Large and small wildlife management areas containing approximately 37,600 acres (total) would be identified to produce and maintain blocks of old growth or mid-age (mature) habitat. The

large areas (1,920 acres) would contain 640 acre blocks of mid-age or old growth while the small areas (240 acres) would contain 80-acre blocks of mid-age or old growth. Proposed timber management activities necessary to achieve the desired habitat diversity would focus on three main objectives. Existing mid-age and old-growth timber would not be harvested. A limited harvest of younger-aged stands would be permitted when not in conflict with achievement of the desired effect. When all wildlife management areas contain the desired level of mid-age or old-growth, they would be placed in a constrained timber production base utilizing a 350-year MHA. Appendix C contains a detailed discussion of ecosystem management.

These blocks would be distributed over the entire SYUs rather than confined to corridors as in Alternative 4. All other resource management practices and constraints would be the same as described in the proposed action. The annual timber sale program includes a hardwood harvest component (Table 1-2). Timber stands available for harvest would have an average size of 19 inches dbh, normally reached in 70 years. Harvest at this size would occur from the 3rd through 11th decades during the 400-year projection period.

Alternative 6 - Lower Average Minimum Harvest Size

This alternative is identical to the proposed action (same land use allocation and management objectives) except for the minimum harvest size (MHS). Timber stands available for final harvest would have an average minimum size of 15 inches dbh, normally reached in 50 years. In actuality, harvest at this size would occur from the 6th through the 19th decades during the 400-year projection period. The annual timber sale program would include a hardwood timber harvest component (Table 1-2). A regulated forest on intensive timber production lands would be reached in about the 23rd decade in contrast to the 12th decade under the proposed action.

It is assumed that by the time a regulated forest is achieved, the annual harvest level from the lands allocated to timber production under the proposed action and this alternative (as well as Alternative 7) could be increased to the highest level sustainable (estimated to be approximately 183 MM bd.ft.).

Alternative 7 - Higher Average Minimum Harvest Size

This alternative is identical to the proposed action (same land use allocation and management objectives) except for the minimum harvest size (MHS). Timber stands available for final harvest would have an average minimum size of 19 inches dbh, normally reached in 70 years. In actuality, harvest at this size would occur from the 4th through the 11th decades during the 400-year projection period. The annual timber sale program includes a hardwood timber harvest component (Table 1-2). A regulated forest on intensive timber production lands would be reached in about the 10th decade in contrast to the 12th decade under the proposed action.

Alternative 8 - No Control of Competing Vegetation with Herbicides

This alternative is the same as the proposed action in timber base and treatments, except that herbicides would not be used to control grass, brush and hardwood species growing in competition with commercial coniferous tree species. This would eliminate herbicide treatments for the control of competing vegetation prior to reforestation (site preparation), during establishment (stocking maintenance) and after young stands become established (release). Control of vegetation for timber management by using biological, mechanical or manual means would be prescribed to approximately the same dollar level of investment as would be used for herbicides in the proposed action to provide a means of direct comparison between the two alternatives.

Continuation of the "no herbicides" alternative beyond the first decade would be expected to result in a reduction in future potential timber productivity. When the forest reaches regulation 12 decades in the future, productivity would be approximately 10 percent less than that realized from continuation of the proposed action.

The difference in timber production between this alternative and the proposed action could possibly be narrowed by greater investments in manual and mechanical methods. However, there is some question about the cost effectiveness of continued manual and mechanical treatments on a given site. Levels of investment will be addressed in the decision document which is prepared after the final EIS.

Alternative 9 - No Allowable Cut Effect

The same allowable cut base, management practices and constraints used for the proposed action are used for this alternative. The difference is that credit for expected yields from intensive timber management practices (genetically improved stock, fertilization, precommercial and commercial thinnings) would not be taken until gains in tree growth are realized in future inventories. The annual timber sale program would include a hardwood timber harvest component (Table 1-2).

Alternative 10 - No Action (No Change)

This alternative constitutes a continuation of the present allowable cut which, unlike the proposed action, excludes the hardwood timber harvest component (Table 1-2). Continuation of the same management practices and constraints used in the 1972 allowable cut calculation is assumed. Minimal protection would be provided for some highly scenic areas, recreational sites and wildlife habitat. Other land use allocations (Table A-2) and management objectives (Table 1-2) proposed under this alternative are those planned for the second decade of the 1972 Timber Management Plan. Planned levels of commercial thinning and precommercial thinning called for in the 1972 cut calculation are not achievable.

FOREST MANAGEMENT TREATMENTS AND DESIGN ELEMENTS

Table 1-2 displays, in typical sequence, the types and levels of treatments for each alternative including the proposed action. Following harvest by clearcut or single tree selection, these treatments are used to achieve prompt reforestation and to increase subsequent growth of commercial coniferous species. The following discussion of treatments will be in the same order as listed in Table 1-2.

Not every treatment listed in Table 1-2 would be applied to every acre. A number of treatment combinations are possible and could be employed. The purpose of this section is to elaborate on what each treatment entails and quantify the magnitude of the actions. Treatments would be identified and scheduled through application of the recently adopted forest data system (Solutions to Operations and Reforestation Monitoring Systems-STORMS 1981). For those actions required in timber sale contracts, the final determination of treatment needs would be made during timber sale planning.

Contracts, usually awarded on a competitive basis, are the means of accomplishing all timber harvest and many forest development practices. The standard and special provisions (which include mitigating measures) in a contract set forth the performance standards to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations and policies. In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken and the physical characteristics of the specific site. The standard provisions of the basic timber sale contract, Bureau Form 5450-3, are applicable for all timber sales. Bureau manuals and manual supplements provide a variety of approved special provisions for use, as appropriate, in individual contracts. The combination of selected special provisions constitutes Section 41 of the timber sale contract (Form 5450-3).

Prior to any vegetative or ground manipulation, BLM requires a survey of the project site for plants and animals listed or proposed for listing on Federal and official State lists of threatened and endangered species. If a project might affect any listed or proposed threatened or endangered species or its critical habitat, every effort would be made to modify, relocate or abandon the project in order to obtain a no effect determination. If BLM determines that a project cannot be altered or abandoned, consultation with the U.S. Fish and Wildlife Service would be initiated (50 CFR 402; Endangered Species Act of 1973, as amended).

Whenever evidence of historic or prehistoric occupation is identified during BLM activities, special surveys are undertaken to determine possible conflicts in management objectives. In addition, a Class III (complete) cultural resources inventory is required on all areas to be subjected to ground disturbing activities. This is accomplished in the pre-planning stage of a treatment and the results analyzed in the environmental assessment addressing the action (BLM Manual 8100, Cultural Resources Management). When a cultural resource is discovered during timber harvest or associated activities, operations in proximity are immediately suspended and may only

resume upon receipt of written instructions from the authorized BLM officer. Procedures under 36 CFR 800 would then be followed including consultation with the State Historic Preservation Officer in the determinations of eligibility, effect and adverse effects.

Transportation System

Oregon Manual Supplement, Release 5-115 of April 10, 1975, would be used in preparing road construction requirements for timber sale contracts. Engineering terminology and types of construction equipment are defined in the manual supplement and specifications for all aspects of construction, reconstruction and surfacing are provided.

Methods of slope protection are provided to avoid collapse of cut-and-fill embankments. Specifications for rock pits and quarries include provisions for minimum visual intrusion, drainage and control of runoff and restoration following use.

Special stipulations are provided for the installation of stream crossing structures, such as corrugated metal culverts, so that fish passage is not impeded. These measures may include imposing gradient limitations for the structures and/or installing baffles to reduce water velocity through the culverts.

One section of the manual supplement provides design features to control and minimize erosion during road construction and throughout the design life of the road. Another section addresses soil stabilization practices including planting, seeding, mulching and fertilizing for establishment of soil-binding vegetation.

Since portions of the existing road system are underdesigned, obsolete or unsafe, approximately 120 miles of road would be reconstructed during the 10-year period for the proposed action and all alternatives. On the average, an estimated 17.3 miles of new, permanent road would be constructed annually, during the decade, for the proposed action and all alternatives except 1, 4 and 5. Alternatives 1, 4 and 5 would need the annual construction of an estimated 17.9, 14.3 and 10.8 miles of new road, respectively. It is estimated that 375 miles (3,000 additional acres) of road are necessary to largely complete the SYUs' permanent road system for the proposed action and all alternatives except 4 and 5. Therefore, it is assumed that the permanent road system would not be completed until the third decade. Construction standards, i.e., stream crossing, subgrade width, ditch, cut-and-fill slope requirements, and type of surfacing would be determined during the annual timber sale planning process. Basic construction operations as well as a brief history of transportation systems are described in detail in the programmatic environmental impact statement BLM prepared on timber management in the western United States (USDI, BLM 1975), hereafter referred to as the BLM Timber Management FEIS.

Timber Harvest

The primary timber harvest method to be employed during the next 10-year period would be clearcutting. An estimated 33 percent of the proposed final harvest by clearcutting (See Table 1-2 for proposed acreages by alternatives) would be accomplished by ground or surface cable yarding systems. Another 53 percent would be accomplished by cable yarding systems providing partial log suspension and 6 percent providing full log suspension. The remaining 8 percent would be harvested by tractor skidding, of which 25 percent would be accomplished using "low ground pressure" equipment. This variety of logging systems is a design feature employed primarily for watershed protection and reduced soil damage. Refer to the BLM Timber Management FEIS for a detailed description of logging systems.

Timber harvesting limitations pertaining specifically to clearcutting, as identified in the Church Report (U.S. Congress, Senate 1972), have been adopted by BLM. These limitations are incorporated in the Oregon Manual Supplement 5424, which lists special provisions or stipulations for use in the logging requirements portion of a timber sale contract. However, Alternative 1 would not be fully consistent with the 5-year regeneration limitation.

Acreage allocated to the constrained timber base (Table 1-3) for visual concerns would be harvested utilizing a two-stage shelterwood method (two entries into the same stand). The first entry, or regeneration cut, would remove 30 to 60 percent of the original stand basal area. The second entry, or final harvest cut, would occur when regeneration is established and has grown to a height that hides stumps and debris (approximately 7 to 10 years.) The acreage figures (shelterwood) shown in Table 1-2 are those proposed for regeneration cut. Under all alternatives, there are currently 3,630 acres of overstory shelterwood that would be scheduled for final harvest during the first decade.

Single tree selection would be employed for harvest of dead and dying timber (mortality salvage) in stands not scheduled for harvest within the 10-year period. Mortality salvage would take place on lands in the intensive timber and VRM II constrained timber production bases and on all other lands in the event of a major catastrophic event or when beneficial to wildlife or fish. The variance in acreages proposed for mortality salvage (Table 1-2) reflects the differences in over-mature timber available under each alternative.

Commercial thinning would be applied to intensively managed timber stands between the ages of 30 and 70 years. The interval of treatment (ranging from 7 to 30 years) would vary according to site characterization with poor sites having longer intervals. Acreages proposed for commercial thinning by alternative are presented in Table 1-2.

Site Preparation

Site preparation procedures are used to prepare newly harvested and inadequately stocked areas for the planting of a new crop of trees. Five

types of site preparation treatments (broadcast burning, herbicides, mechanical, manual and stand conversion) are planned within the SYUs for the proposal period (Table 1-2).

The main site preparation treatment would be broadcast burning to control competing vegetation, provide planting site accessibility and reduce the fire hazard. Burning would occur at times approved by the Oregon State Department of Forestry which administers the Smoke Management portion of the State's Air Quality Implementation Plan. Acreage requiring slash disposal by broadcast burning (Table 1-2) may receive one or more of the following site preparation treatments.

Site preparation treatment using herbicides (Table 1-4) is included in all alternatives except Alternative 8. Herbicides are used to increase plantation survival rate by control of grasses, forbs, brush and noncommercial tree species. These treatments improve the potential for success by reducing competition for light, moisture and soil nutrients during the tree seedling establishment period. Application and monitoring of herbicides would be in accordance with BLM's FEIS Vegetation Management with Herbicides: Western Oregon 1978 through 1987. See the following Plantation Maintenance and Release section for more detail.

Manual site preparation would occur on some acreage during the proposal period (Table 1-2). Treatments could consist of scalping or brush cutting and piling for burning.

Mechanical site preparation would consist of scarification and piling or windrowing of slash, brush and unmerchantable stems. Bulldozers equipped with a brush blade would normally be used. However, using this type of equipment would be restricted to areas with slopes less than 35 percent, low soil moisture conditions and suitable soil types.

Stand conversion would take place on acreage identified as productive conifer sites currently occupied by brush and/or unmerchantable hardwood stands. Conversion acres proposed in Table 1-2 could be mechanically, chemically or manually treated prior to burning.

Planting

To achieve adequate reforestation within 5 years following harvest on timber production lands, harvested areas would be planted with commercial coniferous species within 1 year of the completion of harvesting. Planting stock is nursery grown from seed collected on sites and at elevations similar to the specific project area. Genetically improved stock is also being nursery grown and would be scheduled for planting on 14,333 acres. The broad selection of parent trees for genetically improved stock is intended to maintain genetic diversity (BLM Instruction Memorandum OR 79-334).

Reforestation experience in the WSSYUs shows that target stocking levels of 245 to 320 trees per acre depending on site class cannot always be achieved

Table 1-4 Estimated Ten-Year Use of Herbicides Based on Proposed Action Acreage

Chemical	Method	Season	Carrier	Target Species	Application Rate 2/ (lbs./Acre)	Estimated Acres: Proposed Action	Alt.1	Alt.2	Alt.3	Alt.4	Alt.5	Alt.6	Alt.7	Alt.9
SITE PREPARATION														
Atrazine	Aerial	Spring	Water	Annual and perennial grasses and forbs	4.0	1,000	1,249	1,160	1,118	919	655	1,000	1,000	1,000
Roundup (glyphosate)	Aerial	Spring	Water	Salmonberry, Hazel, Thimbleberry, Vine Maple	3.0	1,800	2,168	2,014	1,941	1,597	1,138	1,800	1,800	1,800
Tordon 101 (picloram - 2,4-D)	Aerial	Early Summer	Water	Preburn Spray	10.0	1,400	1,709	1,587	1,530	1,258	896	1,400	1,400	1,400
Tordon 101R (picloram)	Hand	All Seasons	Undiluted	Bigleaf Maple (cut stumps)	0.5	1,200	1,446	1,343	1,294	1,064	758	1,200	1,200	1,200
STAND RELEASE														
2,4-D	Aerial	Summer	Water & Diesel	Red Alder, Madrone, Ceanothus, (mixed hardwoods)	2.0	1,500	1,818	1,706	1,571	1,359	972	1,500	1,368	1,099
2,4-D	Aerial	Spring	Water & Diesel	Red Alder, Madrone, Ceanothus, (mixed hardwoods)	3.0	1,500	1,818	1,706	1,571	1,359	972	1,500	1,368	1,099
Asulox	Aerial	Summer	Water	Bracken Fern	7.0	1,500	1,818	1,706	1,571	1,359	972	1,500	1,368	1,099
Roundup (glyphosate)	Aerial	Late Summer	Water	Salmonberry, Hazel, Thimbleberry, Vine Maple	1.5	6,500	7,791	7,313	6,733	5,827	4,165	6,500	5,863	4,711
Krenite	Aerial	Late Summer	Water	Red Alder, Vine Maple, Blackberry	3.0	2,000	2,337	2,194	2,020	1,748	1,249	2,000	1,759	1,413

1/ Herbicides would not be used under Alternative 8 and total acres to be treated under Alternative 10 were not identified.

2/ Active ingredients (in total pounds) applied may be figured by multiplying the application rate by the estimated acres under each alternative.

by the initial planting. Post-treatment surveys would be conducted to determine the rate of survival and when replanting or interplanting would be required to meet stocking standards.

Plantation Protection

Estimated acreages that would require some type of protective treatment are shown in Table 1-2. Approximately 500 acres infected with laminated root rot would be treated to restrict spreading of the disease. Other treatments would include protection from the sun by shading and placing plastic tubing or netting over seedlings to protect them from damage by deer, elk, mountain beaver or other small animals. Mountain beaver would be trapped when they occur in significant numbers in a plantation. Seed orchards and progeny test sites would be fenced. The total number of acres requiring each of these treatments would be determined in conjunction with normal reforestation surveys.

Plantation Maintenance and Release

Maintenance treatments promote the survival and establishment of coniferous seedlings. Release treatments reduce competition for light, moisture and nutrients between shrubs or grass and existing commercial coniferous seedlings and promote dominance and growth of established coniferous trees.

Fast-growing hardwoods, such as red alder or vine maple, overtop and suppress slow-starting conifer seedlings. The degree and type of competition varies with the individual site. On dry sites, grass competes effectively for water, while elsewhere hardwoods grow rapidly enough to shut out essential light and compete for water during the dry summer. With reduced competition, the conifers rapidly grow beyond the point where they can be overtopped and further suppressed by surrounding vegetation. When this growth situation is achieved (approximately 3 to 10 years from planting), there would be no further control of competing vegetation necessary.

Each area proposed for maintenance or release treatment would undergo a site specific environmental assessment. During this analysis, alternative methods of vegetation control are considered including chemical, manual and mechanical means.

In recent years, herbicides have been used effectively to inhibit the growth of competing vegetation, thus increasing available water, nutrients and light for suppressed conifers. Herbicides are applied aerially or by several ground methods. The method selected is dependent on costs, topography, limits of the equipment, kind and dispersion of target plants, potential environmental impacts and biological conditions. Most of the herbicides proposed for use in the WSSYUs would be applied by helicopters equipped with positive shut-off spray systems to limit herbicide aplication to the target areas. Helicopter application would be accomplished under contract through the competitive bidding process.

Timing of herbicide treatment is stringently controlled in relation to specified weather conditions such as temperature, humidity and wind. There is full authority for ordering cessation of operations based on adverse field conditions. Both equipment and operators are frequently checked by field project supervisors. Only registered chemicals would be used and in accordance with labeled instructions on the container. Handling, storage and application of chemicals would be in accordance with the Oregon Forest Practices Rules (See the Interrelationships section, State and Local Government).

Design features included in herbicide project plans and contracts for application receive site specific environmental assessment. Assessments addressing specific herbicide projects are prepared and tiered under BLM's FEIS Vegetation Management with Herbicides: Western Oregon - 1978 through 1987.

Protective stream buffers (determined according to stream classification and herbicide used) and monitoring of herbicide application are as described in the FEIS mentioned above. Continuous administration of spraying contracts in progress is required. Water samples of adjacent streams are taken prior to spraying to establish baseline quality and at specified intervals thereafter.

The use of herbicides for release is included in all alternatives except for Alternative 8. Table 1-4 shows the chemicals, target species and estimated acreage of herbicide use as proposed during the 10-year period. Alternative 8, which does not incorporate herbicide use, employs manual methods for release of 4,070 acres. All other alternatives except 10 would employ manual methods on approximately 700 acres during the proposal period. Manual release would consist of clearing around selected commercial tree species using hand tools.

Precommercial Thinning

Precommercial thinning would be applied to all timber stands between 10 and 20 years of age which contain over 500 stems per acre. This treatment concentrates available nutrients, moisture and light into those trees which would be the eventual crop for future harvest.

The number of trees removed, per acre, during precommercial thinning is dependent on the density of the stand before thinning. While average spacing is approximately 12 feet, the number of crop trees left may vary between 245 and 320 per acre. Contract specifications, emphasized by field instructions to crews, cover desired spacing of crop trees and criteria for crop tree selection.

Fertilization

Portions of precommercially and commercially thinned areas would be fertilized (Table 1-2). However, prior to fertilization a detailed on-site soil analysis would be employed to determine composition of fertilizer needed,

rate of application and timing between applications. The average application is expected to be 200 pounds of nitrogen per acre beginning when the stand is precommercially thinned and at 10-year intervals thereafter until 10 years before final harvest. In addition to acceleration of growth for up to 7 years following treatment, fertilization tends to reduce shock associated with thinning.

COMPARISON OF IMPACTS

This section compares in tabular form (Table 1-5) the impacts of the proposed action and each alternative. While impacts have been described in detail in Chapter 3, Table 1-5 is presented to assist decisionmakers and reviewers by summarizing the impacts of each alternative, thereby permitting major issues to be defined and analyzed.

From the summary table, it can be seen that major issues include wildlife habitat modification, economic conditions, soil erosion, sedimentation and visual resources protection.

Two areas of major impacts are wildlife habitat and economic conditions. The greatest habitat modification would occur in Alternative 1, where about 99 percent of old-growth habitat would be removed by the end of the first decade. Alternatives 5 through 9 and the proposed action would increase old-growth habitat.

Alternative 1 would be most beneficial to the economic situation, providing nearly 900 additional jobs than continuation of the existing program. Alternative 5 would have the greatest adverse impact, providing approximately 1,500 fewer jobs than would a continuation of the existing program (Alternative 10).

Other major areas of impact are soil erosion and sediment yield. All alternatives except 1 would have less erosion than experienced during the past decade. Cumulative sediments produced as a result of activities of the proposed action and all alternatives except 1 and 2 would be expected to decrease from levels in the past decade. Alternative 5 would have the least adverse impacts attributable to either soil erosion or sediment yield.

Visual resources would be severely degraded under Alternatives 1 and 2. Under Alternative 10, adverse visual impacts would be moderate. Alternative 5 would provide the highest degree of protection. All other alternatives would provide protection of most highly scenic and/or sensitive areas.

IMPLEMENTATION

Final Decisions

After release of the final EIS (but not before conclusion of the 30-day comment period) the District Manager will review the public comments on both draft and final EISs and prepare a draft Decision Document. The proposed decision may be to select one of the EIS alternatives (including the proposed action) intact, or to blend features from several alternatives that fall

Table 1-5 Summary of Impacts

Environmental Components Impacted	Units of Measure	Existing Situation	Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt. 10 No Action	Remarks
Air Quality														
Carbon monoxide	tons/year	8,823	11,461	15,192	13,509	12,862	10,306	7,585	11,793	11,042	11,061	13,405	10,299	
Nitrogen oxide	tons/year	136	176	234	208	198	159	117	181	170	170	206	158	
Hydrocarbons	tons/year	848	1,102	1,461	1,299	1,237	991	729	1,134	1,064	1,064	1,289	990	
Particulates	tons/year	1,425	1,851	2,454	2,182	2,078	1,665	1,225	1,905	1,784	1,787	2,165	1,664	
Soils														
Erosion	tons/decade	30,656	27,721	51,449	28,628	28,098	25,659	22,904	27,816	27,619	27,675	28,241	27,652	
Water Resources														
Sediment yield	tons/acre/ decade	6,181	5,709	7,410	6,483	6,048	5,226	3,837	5,876	5,404	5,610	4,549	5,734	
Increased nitrogen	tons/decade	38	48	63	55	51	44	33	49	45	46	37	44	
Vegetation														
Acres denuded														
Road construction	acres/decade	1,770	1,384	1,432	1,384	1,384	1,144	864	1,384	1,384	1,384	1,384	1,384	
Yarding	acres/decade	8,122	4,276	5,552	4,909	4,599	3,958	2,886	4,387	4,067	4,210	3,470	4,294	
Plant habitat altered by														
Herbicide use	acres/decade	6,000	18,400	22,154	20,729	19,349	16,490	11,777	18,400	17,126	-0-	14,821	-	Total acres not identified
Timber harvesting	acres/decade	37,919	26,284	34,353	30,219	28,224	24,347	17,763	27,012	24,921	25,852	21,060	-	for Alternative 10.
Wildlife Habitat														
Habitat modified	acres/decade	NA	32,300	40,500	34,500	34,400	29,800	22,400	33,000	30,900	31,800	27,000	25,500	Roads, harvest, thinning & hardwood conversion
Early successional stage habitat, end 1st decade	acres	50,800	43,700	51,300	47,200	45,300	42,200	36,000	44,500	42,400	43,300	39,500	41,400	Habitat less than 15 yrs old
Early successional stage habitat, end 10th decade	acres	50,800	44,200	65,100	51,100	46,500	41,000	23,700	54,300	32,800	46,500	26,000	44,000	Habitat less than 15 yrs old
Old-growth habitat, end 1st decade	acres	11,800	12,000	8,200	8,400	8,900	9,600	13,200	12,000	12,000	12,000	12,000	3,400	Habitat 196 yrs. & older
Old-growth habitat, end 10th decade	acres	11,800	17,700	100	900	6,100	14,500	27,000	17,700	17,700	17,700	17,700	700	Habitat 196 yrs. & older
Wildlife Population														
Roosevelt Elk, end of 5th decade	Percent change from existing	NA	-5	*	*	-30	-10	+40	-5	-5	-5	-5		
Roosevelt Elk, end of 10th decade	Percent change from existing	NA	+35	*	-50	No change	+50	+110	+35	+35	+35	+35	*	
N. Spotted Owl, end of 1st decade		26	21	0	1	11	19	26	21	21	21	21	0	300 acre old growth habitat minimum
N. Spotted Owl, end of 10th decade		26	21	0	1	11	19	26	21	21	21	21	0	
N. Spotted Owl, end of 1st decade		26	1	0	0	1	1	10	1	1	1	1	0	
N. Spotted Owl, end of 10th decade		26	1	0	0	11	1	1	1	1	1	1	0	1,000 acre old growth habitat minimum

* In these alternatives, elk populations are expected to be maintained at less than 500 animals.

Table 1-5 Continued

Environmental Components Impacted	Units of Measure	Existing Situation	Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt. 10 No Action	Remarks
Recreation	Ability to meet needs	--	+L	-L	-L	+L	+L	+M	+L	+L	+L	+L	-L	
Cultural Resources	Inadvertent degradation (undiscovered sites)	--	-L	-H	-M	-M	-L	-L	-L	-L	-L	-L	-M	Based on comparison of harvest levels
	Information loss (known sites)	--	0	-L	-L	0	0	0	0	0	0	0	0	
Visual Resources	Contrast	--	-L	-H	-H	-L	-L	+L	-L	-L	-L	-L	-M	
Areas of Critical Enviromental Concern	Degradation of resource values	--	0	-H	-M	-L	-L	-L	0	0	0	0	-H	
Special Areas	Site degradation	--	-L	-H	-M	-M	-L	-L	-L	-L	-L	-L	-M	Based on comparison of harvest levels
Energy Use	Trillion Btu's consumed annually	--	.973	1.216	1.129	1.053	.910	.650	1.007	.922	.945	.772	1.041	
Socioeconomic														
Impacts Compared to Existing Condition														
Total earnings	$ thousands	35,263	+ 7,478	+17,265	+13,570	+11,096	+ 5,348	- 5,465	+ 9,046	+ 5,096	+ 6,757	- 1,747	+ 8,266	
Total employment	jobs	1,141	+ 715	+ 1,562	+ 1,225	+ 1,040	+ 520	- 452	+ 858	+ 496	+ 649	- 125	+ 742	
O&C payments	% levies	9.5	+ 1.3	+ 2.1	+ 1.8	+ 1.6	+ 1.2	+ 0.5	+ 1.5	+ 1.2	+ 1.3	+ 0.7	+ 1.5	
Impacts Compared to No Action Condition														
Total earnings	$ thousands	2/	- 789	+ 8,999	- 5,304	+ 2,829	- 2,919	-13,730	+ 781	- 3,168	- 1,517	-10,013	43,529	
	jobs	2/	- 26	+ 821	+ 483	+ 301	- 222	- 1,194	+ 118	- 243	- 92	- 865	1,883	
	% levies	2/	- 0.1	+ 0.6	+ 0.3	+ 0.1	- 0.3	- 1.0	+ 0.0	- 0.3	- 0.2	- 0.7	2.7	

1/ See Chapter 3 for discussion of dual impact measures.

2/ Impacts measured from No Action Condition (Alternative 10).

+ Beneficial - Negative L Low M Medium H High

within the range of actions analyzed in the EIS. Following release of the draft decision document, a 45-day comment period will be provided and a public meeting will be held prior to making the final decision. Significant conflicts, alternatives, environmental preferences, economic and technical considerations and the Bureau's statutory mission will be addressed in the Decision Document. The final decision is expected in the Summer of 1982.

Monitoring and Studies

BLM land management programs are monitored in various ways. Currently, forest management practices are monitored primarily through administration of the contracts under which most actions are authorized. Timber sale contracts are inspected at least once a week, when active, and more often if sensitive operations are in progress. Daily administrative visits are not uncommon when harvest is moving at a fast pace, slash disposal is occurring, or road construction involving critical aspects (such as stream crossing structures) is taking place. Service contracts, i.e., tree planting, precommercial thinning, tubing, manual brush cutting and fertilization, are monitored at regular intervals to determine the quality and quantity of completed work. Visits to these operations range from twice a week to the full-time presence of a Bureau contract administrator, depending on the experience of the contractor and rate of progress. Daily visits usually occur when there is reason to believe that the operator will require help in the interpretation of contract requirements.

Silvicultural treatment success is monitored through a series of inventories and surveys performed at various times during the stand's life. Appropriate stocking surveys are performed both prior to and after a treatment is accomplished. Information from these surveys identifies the need for or success of a particular silvicultural treatment. This information is documented and maintained in the operations and reforestation records systems.

In addition, plans are in progress for expansion of current inventory plots (see 1978 Forest Reinventory, Appendix A) to measure actual growth responses from fertilization and thinning programs in the SYUs.

Water quality monitoring would be carried out in accordance with Executive Orders 11514 (partially amended by 11991) and 12088, Sections 208 and 313 of the Clean Water Act (PL 95-217, PL 92-500 as amended), BLM Manual 7240 and Oregon Department of Environmental Quality Memorandum of Understanding (MOU-OR 158). Standard analytical methods would be followed.

Monitoring systems for other resource management programs (wildlife habitat, water quality, visual, cultural and recreational) outlined in the final decision would be developed and implemented.

Requirements for Further Environmental Assessment

This environmental impact statement may best be described as a regional programmatic statement for the proposed 10-year timber management plan and is

considered applicable for the decade. A series of environmental assessments (EAs) will be prepared on detailed site specific plans for each type of treatment under consideration for each year. Interdisciplinary impact assessment will be tiered within the framework of this and other applicable environmental impact statements.

An environmental assessment of a timber sale (or group of sales) will address the effects of the harvest method, yarding system, road construction or reconstruction, slash disposal and any other treatments conducted under the terms of a timber sale contract. EAs will also be prepared in forest development projects such as precommercial thinning, animal damage control, fertilization and herbicide applications. It is expected that environmental assessments will either identify modest impacts or lead to mitigation resulting in modest net impacts. With problems and conflicts identified through analysis, it is possible to design the proposed project in an environmentally sensible manner. Where the action is to be accomplished by a contractor, the environmental assessment is a primary means for determining appropriate contract stipulations. Projects to be accomplished by BLM personnel are conducted in accordance with the findings of the assessment and decision documents.

If an environmental assessment indicates potential for significant impacts not already described in an existing EIS, an environmental impact statement or a supplement to an existing EIS may be required.

INTERRELATIONSHIPS

Much of northwest Oregon is timber producing land. In addition to the BLM, jurisdictions include the U.S. Forest Service, State of Oregon, the counties, and private companies and individuals. Each entity approaches management of timber lands differently, although some periodically prepare internal or public plans for their management.

Federal Agencies

The Westside Salem SYUs share in part a common boundary with the Siuslaw National Forest. Coordination between the BLM District Manager and the Forest Supervisor is routine. Specific project and program coordination takes place as needed between all management levels of each agency and also between resource specialists. A cooperative agreement provides for interagency road construction and use.

The U.S. Army Corps of Engineers has the authority, under Section 404 of the Clean Water Act of 1977 (P.L. 95-217), to regulate the discharge of dredged or fill materials into any estuary, wetland or streams of the United States with flow in excess of 5 cubic feet per second. Normal silvicultural practices are exempt from this regulation. Based on the adequacy of BLM environmental protection practices, the Corps has issued BLM a general permit for all such activities. Under the permit, BLM provides the Corps, the State Division of Lands and certain environmental review agencies with advance notice of specific proposed projects.

The U.S. Fish and Wildlife Service administers the Endangered Species Act of 1973 (as amended). Accordingly, BLM consults with that agency when it is determined that a threatened or endangered species or its critical habitat may be affected. The purpose of consultation is to avoid impacts to the species in question. The outcome of such consultation may mean modification or abandonment of the action.

State and Local Governments

Section 202(c) of the Federal Land Policy and Management Act requires BLM to coordinate its planning efforts with those of State and local governments; assist in resolving inconsistencies in our mutual planning efforts; provide for State and local governmental involvement in development of BLM land use programs, regulations and land use decisions; and develop BLM resource management plans and programs consistent with those of State and local government to the extent that such BLM plans and programs are also consistent with Federal law and regulations. BLM coordination efforts involve a number of State and local administrative and planning agencies as highlighted below.

The Intergovernmental Relations Division for the State of Oregon is the Clearinghouse for the various State agencies. Notice of all BLM planning and major proposed actions are provided for coordinated State level review by the State Clearinghouse. The Regional Councils of Government serve as the clearinghouse for coordinated review of proposed BLM activities by county and local governments in their respective areas of interest. BLM involvement with the 10 counties in the SYUs is largely via the several boards of county commissioners. Through these bodies, county governments participate in planning for land use, road construction and recreational develoments on public lands administered by BLM.

The Oregon Land Conservation and Development Commission (LCDC) administers the state comprehensive land use planning program as provided in Oregon State Statutes, Chapter 197 (ORS 197). In this program, county and local governments are required to develop comprehensive land use plans and implementing ordinances consistent with 14 statewide planning goals and guidelines. These call for a balance between conservation and development to best meet public needs.

LCDC is the primary State agency responsible for implementing the Oregon Coastal Management Program established under P.L. 94-370, the Coastal Zone Management Act (CZMA). This program relies initially on county and local comprehensive planning under ORS 197 with special emphasis on unique characteristics of coastal resources. In addition to the 14 statewide goals for planning consideration, coastal planning is guided by four special State Coastal Goals and Guides: Estuarine Resources, Coastal Shorelands, Beaches, and Dunes and Ocean Resources.

CZMA requires Federal activities to be consistent to the maximum extent practicable with the Oregon Coastal program. Although Federal lands are specifically excluded from the coastal zone, such BLM activities as would

directly affect coastal resources outside the BLM lands require BLM consistency statements. These statements are made through the A-95 Clearinghouse notification and review process. The proposed action and all alternatives except 1 are expected to be consistant with the CZMA.

Close relations have been established with LCDC to ensure cooperation and coordination of BLM programs and planning efforts with those conducted by county and local governments under ORS 197 and CZMA. The relationship of the Westside Salem proposed action and alternatives to the LCDC Statewide and Coastal Goals is shown on Table 1-6. Discussion comments on this table generally focus attention on deficiencies in addressing the listed goals.

Throughout the planning process, BLM has worked with the 10 counties in the Westside Salem SYUs to achieve consitency with local plans. Methods of involving local governments have included: (1) frequent informal contacts to discuss local planning concerns; (2) invitations to participate in public tours, workshops and meetings; and (3) discussions with county planning departments to determine consistency of BLM's preferred land use plan with acknowledged local plans.

The status of county plans involving lands in the SYUs as of May 31, 1981 is shown below:

County	Adopted (By Board of Commissonners)	Acknowledged (Accepted by LCDC)
Benton	x	
Clatsop	x	
Columbia		
Lane	x	
Lincoln	x	
Multnomah	x	x
Polk	x	x
Tillamook		
Washington		
Yamhill	x	x

Upon release of the draft EIS, appropriate counties will be asked to determine the consistency of timber management alternatives with adopted plans. County responses will be published in the final EIS.

The Oregon State Forester, by means of the Forest Practices Act of 1972, regulates timber harvest methods and supportive practices on all non-Federal lands within the SYUs. Minimum standards are prescribed relating to the following forest practices:

- Reforestation of economically suitable lands.
- Road construction and maintenance on forest land.
- Chemical applications.
- Slash disposal.

Table 1-6 Relationship of Westside Salem Proposed Action and Alternatives to LCDC Statewide and Coastal Goals 1/

LCDC Statewide Goal Number and Description	Discussion
1. To insure citizen involvement in all phases of the planning process.	BLM land use planning process provides for public input at every stage--from assistance in the initial inventory to the identification of management opportunities, the development of alternatives, the environmental analysis and the final decision.
2. To establish a land use process and policy framework as a basis for all decisions and actions.	The proposed action and all alternatives have been developed in accordance with the land use planning process authorized by the Federal Land Policy and Management Act of 1976 which provides a policy framework for all decisions and actions.
4. To conserve forest lands for forest uses.	The planning area is predominantly forest land. The proposed action and alternatives all provide retention of inventoried forest lands for forest uses. While Alternatives 1, 2 and 3 place emphasis on increased timber production, Alternatives 4 and 5 stress non-timbered values. No alternative except 1 exceeds the productive capacity of the land base and all proposed uses are compatible with forest uses in this goal.
5. To conserve open space and protect natural and scenic resources.	All alternatives conserve open space. All alternatives except 1 and 2 protect scenic resources to some degree.
6. To maintain and improve the quality of the air, water and land resources.	Only Alternatives 1 and 10 do not fully address necessary enhancement of land and water quality for multiple use of forest lands or for meeting Federal and State minimum water quality standards. Slash burning will increase smoke (See Table 3-1). All alternatives would comply with the statewide smoke management plan.
7. To protect life and property from natural disasters and hazards.	All alternatives include identification of potential hazard areas and general BLM program and operational measures for protection of life and property from natural disasters and hazards.

LCDC Statewide Goal Number and Description	Discussion
8. To satisfy the recreational needs of the citizens of the State and visitors.	Alternatives 1, 2 and 10 would best meet increasing demand for motorized recreational vehicle use areas but would fail to adequately meet increasing needs for other opportunity areas and facilities. The proposed action and Alternatives 3 through 9 would provide opportunities to meet most recreational needs. Under the proposed action and all alternatives, the BLM would actively coordinate outdoor recreation efforts with other agencies.
9. To diversify and improve the economy of the State.	Alternatives 1, 2, and 3 would increase timber production for greater economic returns, but lack diversity in that little or no attention is given to non-timber values. The Proposed Action and Alternatives 4 through 9 provide diversity but result in decreases in total economic returns. Alternative 9 does not include anticipated increased timber production that should result from intensified management practices.
13. To conserve energy.	Conservation and efficient use of energy sources are objectives in all BLM activities. Use of cull logs and slash for chips and firewood is encouraged.

LCDC Coastal Goal Number and Description	Discussion
16. To recognize and protect estuarine resources.	All alternatives recognize and protect estuarine resources. Alternative 1 would contribute the greatest amount of sediment and Alternative 5 the least (Table 3-4).
19. To conserve the long term values, benefits and natural resources of the near shore ocean and Continental Shelf.	BLM programs for protection and enhancement of anadromous fisheries would relate to this goal. As discussed above for Goal 5, Alternatives 1 and 2 make the least provision for protection and enhancement of upstream fisheries habitat.

1/ LCDC goals not generally applicable to the proposal and alternatives are: 3. Agricultural Lands; 10. Housing; 11. Public Facilities and Services; 12. Transporation; 14. Urbanization; 15. Willamette Greenway; 17. Coastal Shorelands; and 18. Beaches.

Although Federal agencies are not bound by State forest practice rules, Bureau minimum standards meet or exceed State rules. The BLM and USFS, acting jointly, have entered into a Memorandum of Understanding with the State Forester in this regard.

BLM is a cooperator in the Statewide Smoke Management Plan administered by the Oregon State Forester in order to comply with the Clean Air Act of 1963 (as amended). The primary objective of the plan is to keep smoke from slash disposal operations away from population centers. Slash burning is allowed to begin only when smoke dispersion conditions are determined by Oregon State Department of Forestry (OSDF) to be favorable.

OSDF is the primary contractor for fire protection of public lands administered by BLM in the SYUs. That department undertakes presuppression and suppression actions for all lands in the area.

The Forestry Program for Oregon (Oregon State Board of Forestry 1977) outlines basic objectives of the Oregon State Board of Forestry for timber land management within the State. The relationship of the proposed action and alternatives to these basic objectives is shown in Table 1-7.

Management of wildlife, including fish, within the SYUs is the responsibility of the Oregon Department of Fish and Wildlife. BLM, in managing lands under its jurisdiction, considers wildlife habitat as a resource category. Cooperative agreements describe the responsibilities of the two agencies.

The Oregon Department of Environmental Quality (ODEQ) has lead responsibility for statewide water quality management planning in accordance with Section 208 of P.L. 92-500 (Federal Water Pollution Control Act) as amended by P.L. 95-217 (Clean Water Act). BLM and ODEQ have entered into a Memorandum of Understanding which outlines their respective roles in meeting State water quality objectives. The Memorandum assures close interagency cooperation, development and implementation of appropriate practices and control measures to comply with the Clean Water Act, and compliance with State requirements. BLM forest management practices meet or exceed objectives of the statewide water quality management plan.

Table 1-7 Relationship of the Proposed Action and Alternatives to the Basic Objectives of the Forestry Program for Oregon

Basic Objective	Proposed Action and Alternatives: Consistent	Minimally Consistent	Inconsistent	Discussion
To maintain the maximum potential commercial forest land base consistent with other resource uses while assuring environmental quality.	PA, 6, 7, 8, 9	2, 3, 4, 10	1, 5	Congressional Acts and Executive Orders (see Purpose and Need section) and State law (Oregon Forest Practices Act) mandate management guidelines for certain lands. Incorporated throughout the planning process, these guidelines have served to define the commercial forest land base consistent with the objective.
To identify and implement the levels of intensive forest management required to achieve maximum growth and harvest.	PA, 1, 2, 3, 4, 5, 6, 7, 9	8, 10		BLM currently implements a full range of intensive timber management practices (refer to Forest Management Treatments and Design Elements, this chapter) for optimization of timber production. New and improved practices would be implemented consistent with technological advances.
To maintain community stability by remaining flexible for increases in future harvest levels that would offset projected shortages.	PA, 1, 2, 3, 6, 7, 8	9	4, 5, 10	Deviation from even-flow sustained yield management would be implemented consistent with Presidential Order (see opening discussion of Proposed Action and Alternatives section). This involves the harvest of available surplus old-growth inventory to offset projected shortages.

Grass Mountain is a 730-acre tract proposed for designation as a Research Natural Area and Area of Critical Environmental Concern.

Little Grass Mountain has recreation, scenic, botanic and wildlife values and is proposed for designation as an Outstanding Natural Area and Area of Critical Environmental Concern.

CHAPTER 2

AFFECTED ENVIRONMENT

CHAPTER 2 AFFECTED ENVIRONMENT

This chapter addresses the environment as it exists today within the Westside Salem Sustained Yield Units (WSSYUs, SYUs). Since timber harvest has been ongoing within the SYUs for several decades, the environment described is seldom pristine but exhibits the effects of human use.

Chapter 2 provides a basis on which impacts of the proposed action and alternatives may be assessed. Data and analysis will be commensurate with the importance of the impact, with less important material summarized, consolidated or simply referenced.

In preparation of this chapter, the primary data sources are documents of the Bureau planning system developed by the Salem District. The Unit Resource Analysis, Planning Area Analysis and proposed Management Framework Plan for the Westside Salem area are available for review at the Salem District Office, Salem, Oregon.

Other references supplementary to or updating planning system data are cited within the body of the text by author and date of publication. A listing of these references appears in the References Cited.

GEOLOGY AND TOPOGRAPHY

The EIS area is located in the Coast Range physiographic province, which extends from the Coquille River in Oregon to the Chehalis River of Washington and includes the Willamette - Puget lowland. It is typified by narrow coastal plains, valley floors along the margins of larger rivers, rugged coastal mountains and irregular foothills east of the main range. Roughness of the terrain generally decreases in the northern section of the Coast Range. Summit elevations vary: the highest point is Marys Peak at 4,097 feet above sea level. Drainage is toward the Pacific Ocean or eastward toward the Willamette or Columbia Rivers. The areas of sedimentary rock are naturally dissected, and have numerous slumps and slides. The areas of igneous rock, more resistant to weathering and erosion than sedimentary rock, are less dissected and subject to shallow, fast-moving slides in steep headwalls.

CLIMATE

The EIS area has a modified marine climate, typified by dry, moderately warm summers and wet, mild winters. The prevailing winds are from the northwest during the summer and the southwest or south during the winter. Wind velocities are commonly 15 to 25 miles per hour (mph) but can at times during winter months reach gale velocity (65 mph).

Because marine air moves across this area most of the year, relative humidity is normally high. Occasional periods of strong, dry easterly winds may occur at any time during the year. In summer, these winds reduce humidity to 10 or 15 percent during the warmest part of the day. These periods of low relative

humidity are of short duration, generally lasting less than 2 weeks throughout the year. Precipitation varies from 40 to 200 inches annually, with the maximum rainfall occurring at the high elevations in the Coast Range. Rainfall varies greatly between the Coast Range zone and the foothills zones, and between east and west slopes.

The EIS area has a very definite winter rainfall climate, with 70 to 85 percent of the total annual precipitation occurring between November and March, and 3 to 10 percent occurring between June and August. Snowfall is not uncommon at elevations over 1,000 feet, lasting only days at lower elevations (near 1,000 feet) but reaching depths of 2-3 feet in the higher elevations and lasting for 1 or 2 months.

Temperatures throughout the WSSYUs are relatively stable with only moderate daily fluctuations. The extreme high temperatures of 100° F or higher occur about every other year, and the low of less than 0° F in one out of 20 years. The average low temperature in January is 31° F, and the average high temperature in July is 79° F.

Freezing periods rarely last more than a week. Damage to plants and soils from freezing occurs on wet sites, although it is infrequent.

AIR QUALITY

Surface air movement in the SYUs is affected by the mountainous terrain, the presence of trees and the type of weather. Mixing of smoke and pollutants cannot be easily generalized for this area since thermal inversions can occur in small valleys throughout the area, and frequently occur in the Willamette Valley. Westerly winds can carry dust from vehicles on unpaved roads or pollutants from slash burning to the populated Willamette Valley. Thermal mixing due to day/night temperature changes is the primary dispersal media for air pollutants.

Oregon is divided into several air quality control regions. The SYUs are located in regions 192 (northwest) and 193 (Willamette Valley). The Portland area of region 192 does not meet either Federal or State requirements for air quality. In addition, air quality in Portland has been worsening since 1976 (ODEQ 1979). Both carbon monoxide and particulates, such as road dust or emissions from wood-burning space heaters, have been identified as the major problems (ODEQ 1979). The urban areas of Salem do not meet standards for carbon monoxide (CO) or ozone (O_3), although Salem's air quality has been improving.

The Oregon Department of Environmental Quality (ODEQ) has monitored particulates since 1971 and visible smoke problems have been monitored by the Oregon State Department of Forestry (OSDF) since 1975. The number of daily violations of standards that have occurred in the SYUs is shown in Table 2-1.

Table 2-1 Air Quality

Days Exceeding Particulate Standards *

	1971	1972	1973	1974	1975	1976	1977	1978	1979
Hillsboro	0	1-F	0	6-S 2-F	3-S 2-F	5-S 1-F	0	1-S	2-S
McMinnville	0	0	0	1-S	0	0	0	0	0
St. Helens	0	0	0	0	0	0	1-S	1-S	0

*State Standard: 150 micrograms per cubic meter (u/m^3); Federal standard: 260 u/m^3

Days with Visible Smoke Intrusions (All Sources)

	1975	1976	1977	1978	1979	1980
Astoria	0	0	0	0	0	1
Forest Grove	0	4	4	4	1	1
Tillamook	5	7	4	3	2	9

Source: ODEQ 1979; OSDF - Annual Reports 1975 through 1980.

Slash burning contributes to air pollution problems by adding to the total particulates, NO_x, SO_x and CO in the atmosphere. From 1976 through 1980, slash burns on BLM-administered lands in the WSSYUs amounted to approximately 7,000 acres out of a total 71,700 acres burned in the seven county area (OSDF 1981). On a yearly basis, BLM slash burn acreage represented 12, 15, 9 and 10 percent of the slash burns in the seven counties for the 1976-1980 period.

SOILS

The general soils map (Figure 2-1) shows the soil associations in the WSSYUs. More detailed maps are available for review at the Salem District Office. A soil association is a landscape that has a distinctive proportional pattern of soils, and is named for the soils that occur as major components. The soils in the EIS area are varied and unique. Certain physical properties of these soils are given in Table 2-2. Within the WSSYUs there are several problem soils. These problems are related to steepness of slopes, groundwater and soils that slump or slide when disturbed. Problem soils are classified severely, moderately or slightly fragile.

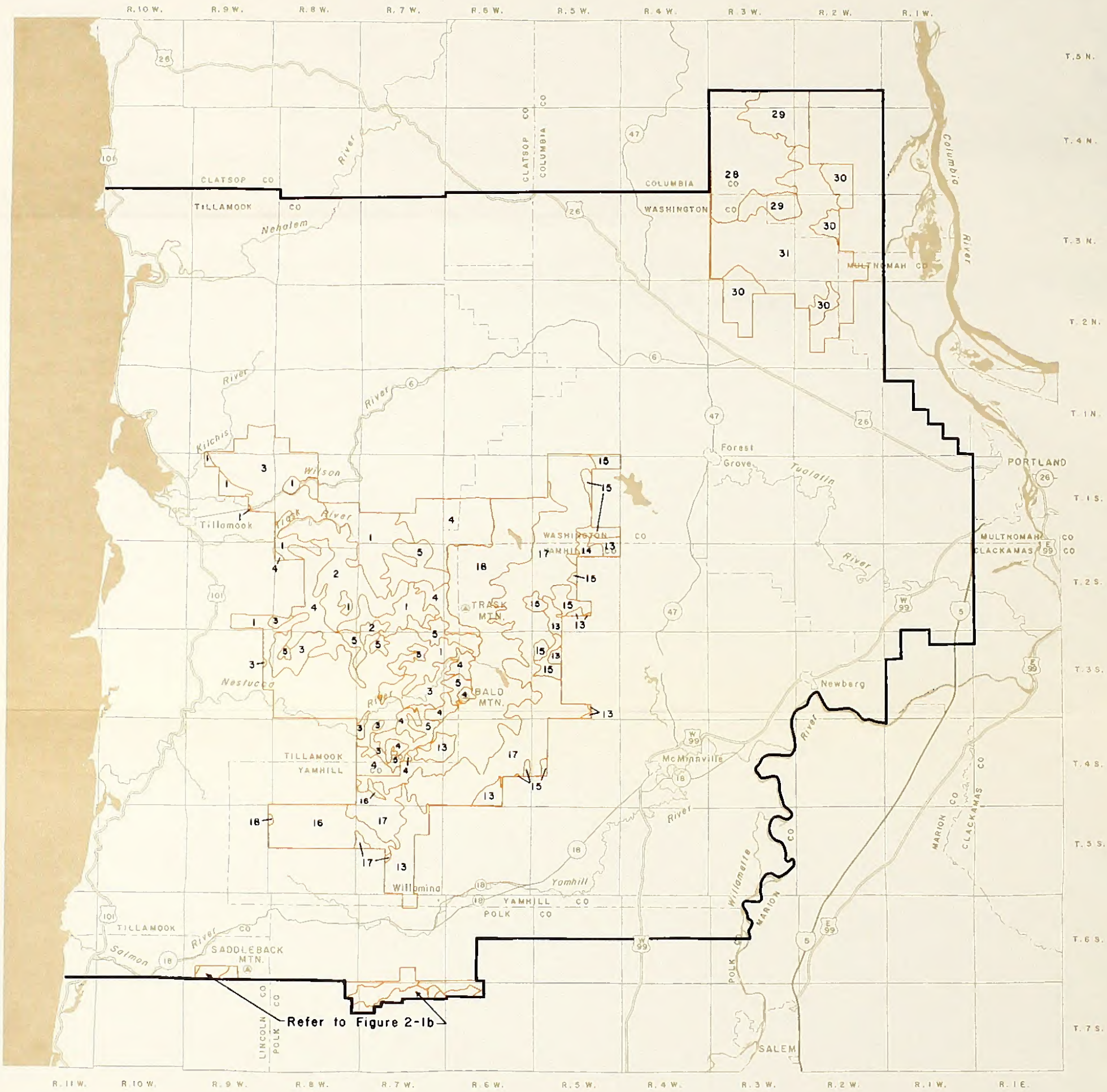
Severe fragile sites are small and scattered throughout the WSSYUs, comprising 8,996 acres (1.7 percent of the area). Criteria used to identify severe fragile sites are shallow soils on slopes greater than 80 percent, a high groundwater table that produces a wet swampy site, geologic parent materials that cause soils to be slumpy or create a slide hazard, soils that are bare or compacted by prior activities or soils that have a known or suspected fertility problem. Nutrient deficiencies have been recognized in Tolke, Marty and Goble series and their associated soils (see Table 2-2).

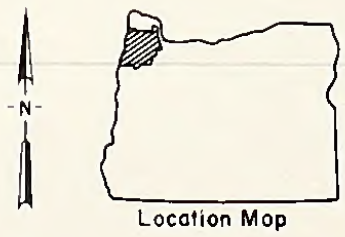
Table 2-2 Soils of the WSSYUs

Map* Unit No.	Name of Association	Acres 1/	% of Area	Soil Depth (inches)	Elevations (Feet)	Slopes	Precip. (inches)
1	42-51	14,455	6%	20-60	200-1,600	Moderate	90-110
2	27-42	4,820	2%	20-60	200-1,600	Mod./Very Steep	100-120
3	323-27	12,525	5%	40-60	200-1,600	Mod./Very Steep	95-120
4	38-37	12,045	5%	40-66	1,600-3,100	Mod./Very Steep	110-130
5	39	4,335	2%	20-40	1,600-2,800	Rolling to Steep	90-130
6	Knappa-Nehalem	1,550	>1%	>60	S.L.-600	0-15%	60-10
7	Jory-Bellpine	775	>1%	20-60+	300-1,200	2-50%	40-60
8	Klickitat-Marty	22,870	9%	40-60+	800-3,500	3-75%	60-120
9	Bohannon-Slickrock	44,280	18%	20-40	100-4,000	0-100%	80-120
10	Blachly-Preacher-Klickitat	2,330	1%	Deep	250-1,500	10-40%	80-100
11	Honeygrove-Peavine	9,315	4%	20-60+	200-1,500	10-40%+	60-80
12	Apt-Bohannon	6,370	3%	20-60+	750-3,500	3-75%	60-120
13	Peavine	6,730	3%	20-40	400-1,200	Rolling to Steep	55-70
14	Laurelwood	960	>1%	>60	300-1,200	3 to 60%	45-50
15	Jory-Bellpine-Nekia	3,365	1%	20-40	250-1,200	Level/Gentle	40-60
16	Ecola-Astoria-Hembre	4,805	2%	20-60	500-2,000	Steep/Very Steep	80-120
17	Olyic	15,860	6%	>60	500-2,000	Gentle/Steep	60-80
18	Hembre-Klickitat-Astoria	16,340	7%	40-60	500-3,000	Gentle to very steep	80-120
19	Knappa-Chitwood	1,405	1%	>60	400-1,100	0-7%	60-90
20	Honeygrove-Peavine-Klickitat	4,685	2%	20-60	400-1,500	10-40%	60-80
21	Bohannon-Preacher-Astoria	6,085	2%	20-60+	100-1,500	Gentle to very steep	80-140
22	Blachly-Kilowan	3,280	1%	20-40+	500-2,000	Gentle to very steep	60-80
23	Astoria-Hembre	935	>1%	40+	500-1,500	Gentle to very steep	80-120
24	Hembre-Klickitat	2,340	1%	20-40	500-1,500	Gentle to very steep	80-120
25	Klickitat-Kilchis-Hembre	6,655	3%	<20-60	250-1,500	10-85%	80-120
26	Valsetz-Cruiser-Yellowstone	10,300	4%	<20-40	1500-3,500	10-100%	80-180
27	Luckiamute	1,405	1%	20-40	1900-3,500	10-40%	90-180
28	Tolke-Goble	4,465	2%	>60	400-2,000	2-80%	60-725
29	Marty-Blachly	2,980	1%	>60	250-3,000	0-75%	60-120
30	Kinton-Laurelwood-Jory	1,860	1%	>60	250-4,000	2-80%	42-46
31	Goble	9,310	4%	>60	250-3,000	0-80%	60-120

1/ There are 4,624 acres of small, unmapped scattered tracts which make up 2 percent of the area.

* Refer to Figure 2-1.





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COLUMBIA SUSTAINED YIELD UNIT

Westside Salem Environmental Impact Statement Area

1981

SCALE

0 5 10 MILE

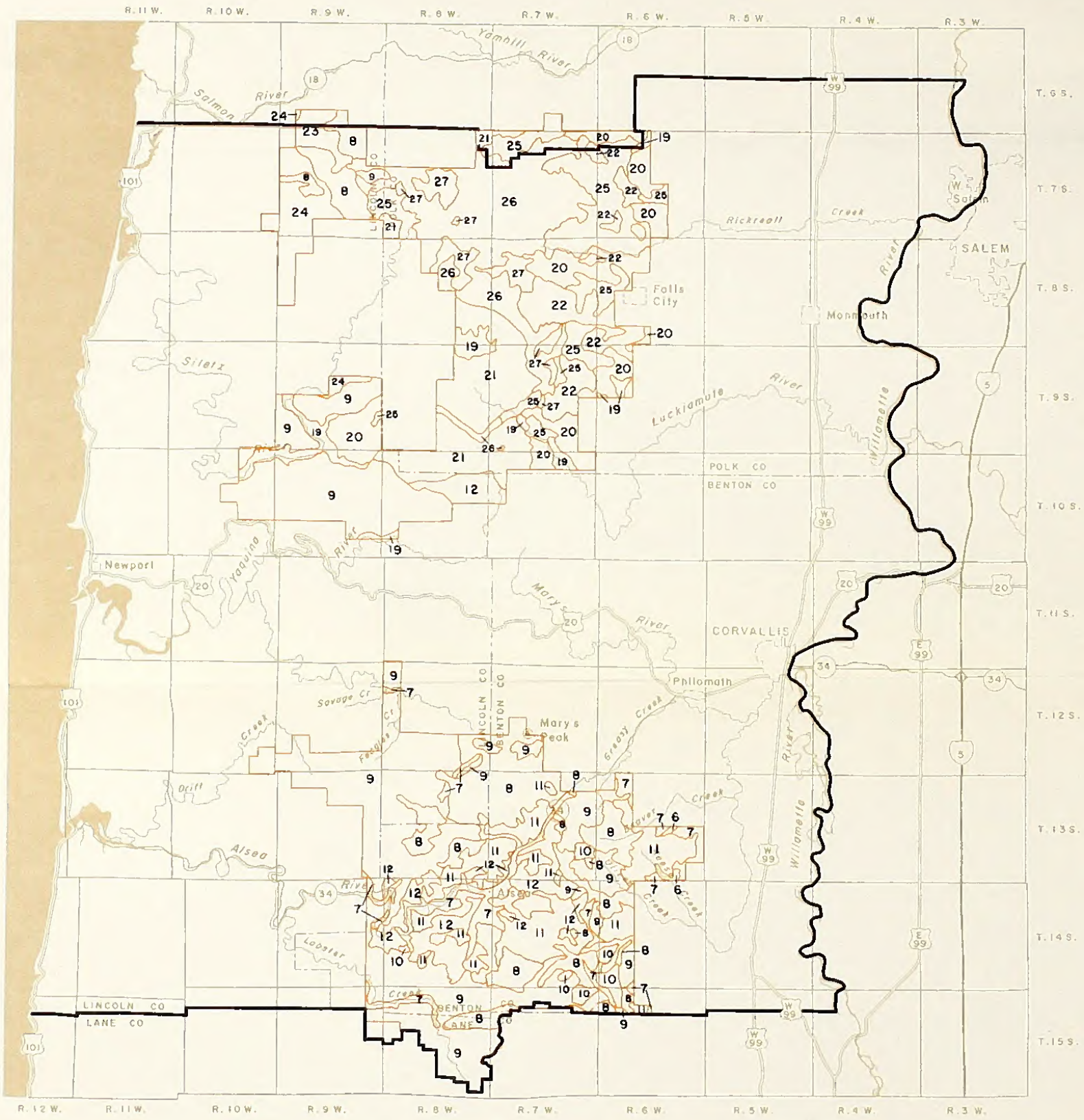
0 5 10 15 20 KM

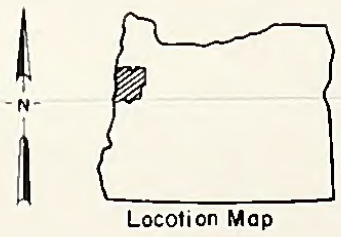
FIGURE 2-1a

GENERAL SOILS

LEGEND

1 42-51
2 27-42
3 323-27
4 38-37
5 39
13 Peavine
14 Laurelwood
15 Jory-Bellpine-Nekia
16 Ecola-Astoria-Hembre
17 Olyic
18 Hembre-Klickitat-Astoria
28 Tolke-Goble
29 Marty-Blachly
30 Kinton-Laurelwood-Jory
31 Goble





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ALSEA-RICKREALL SUSTAINED YIELD UNIT

Westside Salem Environmental Impact Statement Area

1981

SCALE

0 5 10 MILE

0 5 10 15 20 KM

FIGURE 2-1b

GENERAL SOILS

LEGEND

6 Kneppa – Nehalem
7 Jory – Bellpine
8 Klickitet – Marty
9 Bohannon – Slickrock
10 Blachly – Preacher – Klickitet
11 Honeygrove – Peavine
12 Apt – Bohennon
19 Knappa – Chitwood
20 Honeygrove – Peavine – Klickitet
21 Bohannon – Preecher – Astorie
22 Blachly – Kilowen
23 Astoria – Hembre
24 Hembre – Klickitat
25 Klickitat – Kilches – Hembre
26 Valsetz – Cruiser – Yellowstone
27 Luckiamute

There are 10,760 acres of moderately fragile sites (4.4 percent of area) and 9,345 acres of slightly fragile sites (3.8 percent of area). Moderate and slightly fragile sites are also found scattered throughout the WSSYUs. Gentle to steep slopes with no unusual or fragile characteristics make up the bulk of BLM-managed lands (192,960 acres, 79.1 percent).

Surface erosion does not occur to any great extent in the EIS area. The erosion rate in the undisturbed forest is 0.06 tons per acre per year tons/ac/yr. In areas where harvest activities have taken place in the past and regrowth is now established, erosion is 0.08 to 0.09 tons/ac/yr. Erosion is 0.8 to 1 tons/ac/yr in areas that have had major disturbances, such as the area of the Tillamook burn.

WATER RESOURCES

BLM-administered land in the EIS area is drained by approximately 900 miles of second through seventh order streams. The mean annual discharges, area drained and other data of these rivers are shown in Table 2-3. Rivers that drain eastward into the Willamette or the Columbia River are in the Willamette sub-basin of the Columbia Hydrologic Region. Rivers that flow westward, ending in estuaries on the Oregon coast, are in the Oregon North Coast or Oregon Mid-Coast sub-basins of the North Pacific Hydrologic Region. The dividing line between the Willamette and Coastal basins is the crest of the Coast Range mountains (Figure 2-2). Thirty percent of the Alsea-Rickreall SYU is in the Willamette Region and 70 percent is in Oregon Mid-Coast basin. Fifty-seven percent of the Columbia SYU is in the Columbia Region and 43 percent in the Oregon North Coast basin. Figure 2-3 shows the individual drainages described in Table 2-3.

Monthly river flow data for most rivers in the SYUs are given in Water Resources Data for Oregon publications from the U.S. Geological Survey. Peak river flows occur in the winter.

The quality of surface water throughout the SYUs is considered good to excellent (Proctor et al. 1980) although turbidity variations occur seasonally. Water withdrawals for irrigation occurs in the Wilson, Trask, Alsea and Siuslaw Rivers. Water for 27 municipalities is withdrawn from 23 streams in 18 watersheds in the EIS area. Increased water withdrawals throughout the SYUs have reduced summer flows. High water temperatures occur in late summer due to depleted flows.

The rivers and streams that drain the Oregon North Coast and Mid-Coast watersheds flow into the estuaries on the Oregon Coast. The quality of water and biological condition of the estuaries is a measure of the quality of the water in the rivers. In order to maintain present levels of salinity, temperatures, dissolved oxygen and nutrients, the estuaries fed by rivers in the Alsea-Rickreall SYU need augmented inflows of fresh water in summer. Sedimentation is severe in the rivers flowing through the Tillamook burn into the Tillamook Bay.

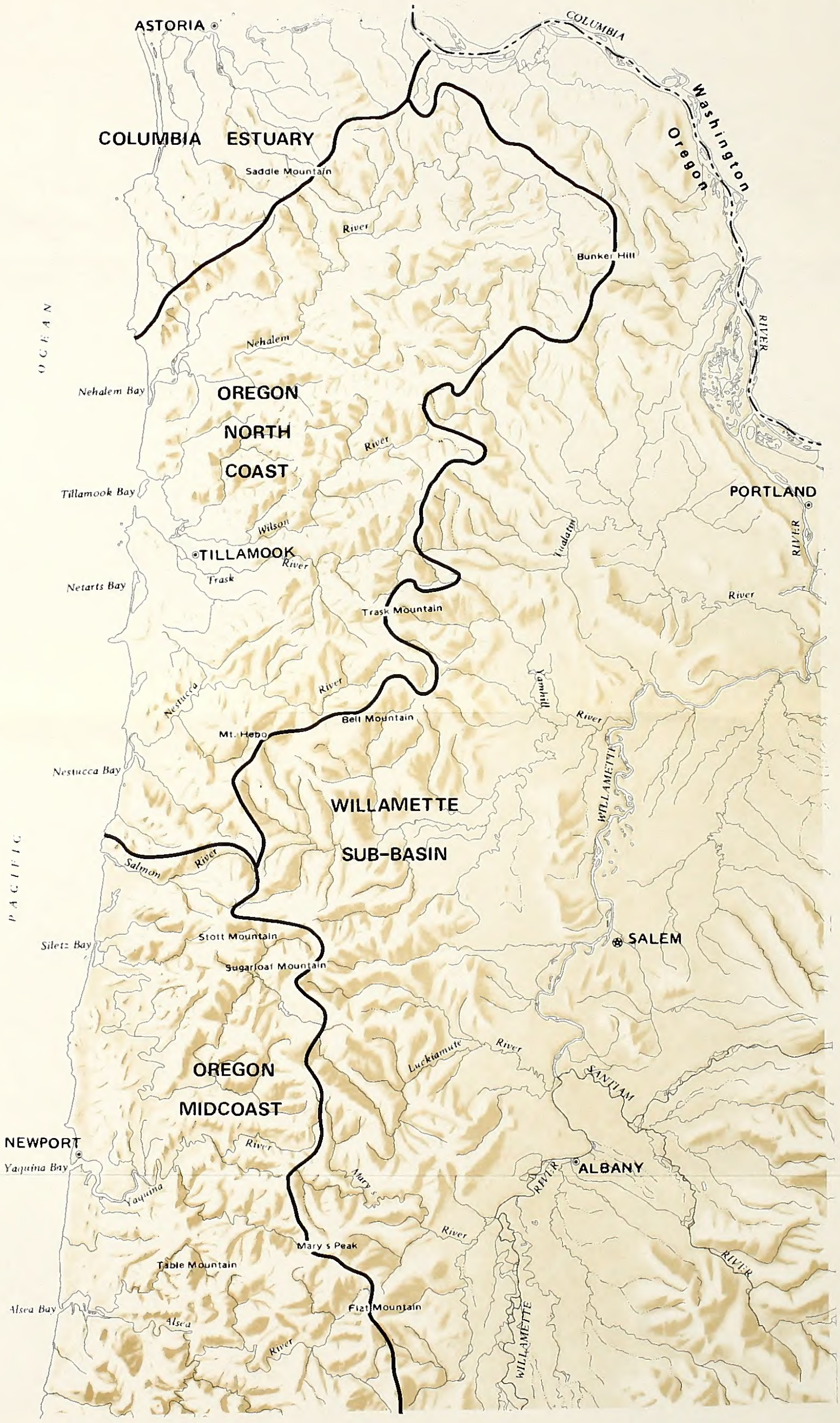
Table 2-3 Water Resources

Map* Unit No.	Drainages	BLM Area 1/ (acres)	Streams (miles)	Stream Gradient (percent)	Average Annual Precipitation (inches)	Average Runoff (inches)	Water Yield BLM (ac-ft)	Water Yield from Watershed (ac-ft)
1.	Upper Alsea River	66,776	78.5	2.4	80-110	60	320,984	694,727
2.	Beaver-Greasy-Oliver-Reese	5,574	19	3.3	50-100	43.5	20,193	134,164
3.	Columbia	6,080	21	2.2	45-60	18	11,300	46,300
4.	Drift Creek	2,048	21	2.5	110-160	80	13,653	179,627
5.	Drift-Feagles-Savage	2,538	13	3.6	90-110	74	14,523	156,651
6.	Kilchis River	2,944	NA	2.0	NA	82	20,214	293,124
7.	Lobster Creek	13,501	27	1.5	90-110	63	70,993	198,555
8.	Luckiamute River	4,616	144	1.5	50-180	72	24,575	1,029,504
9.	Nehalem	4,736	8.5	2.4	50-60	17	6,834	29,920
10.	Nestucca River	37,640	107	0.9	NA	70	219,567	975,147
11.	Marys River	0	14	2.0	70-100	65	0	90,827
12.	Rickreall Creek	3,392	19	2.6	50-140	70	19,787	157,547
13.	Salmon River	2,816	30	1.8	80-180	80	18,773	327,253
14.	Siletz River	13,074	139.5	0.8	80-180	80	111,360	1,323,520
15.	Trask River	9,088	64	0.9	50-120	76	56,951	731,145
16.	Tualatin River (north portion)	6,336	32	1.7	40-50	19	9,821	107,830
17.	Tualatin River (south portion)	3,960	28.5	3.8	50-100	50	16,500	181,067
18.	Wilson River	2,944	NA	0.9	NA	74	18,253	764,634
19.	Yamhill River (northern)	38,410	147	2.6	50-120	60	192,050	1,226,880
20.	Yamhill River (southern)	16,512	52	3.4	50-180	70	96,320	431,573
21.	Yaquina River	704	38.5	1.2	70-90	60	3,520	273,280

1/ Miscellaneous scattered tracts make up an additional 370 acres.

NA = No data available

* Refer to Figure 2-3.



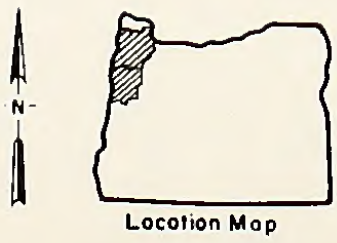


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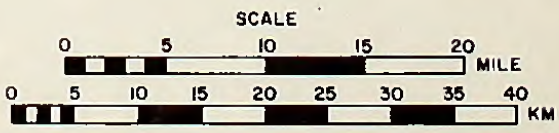
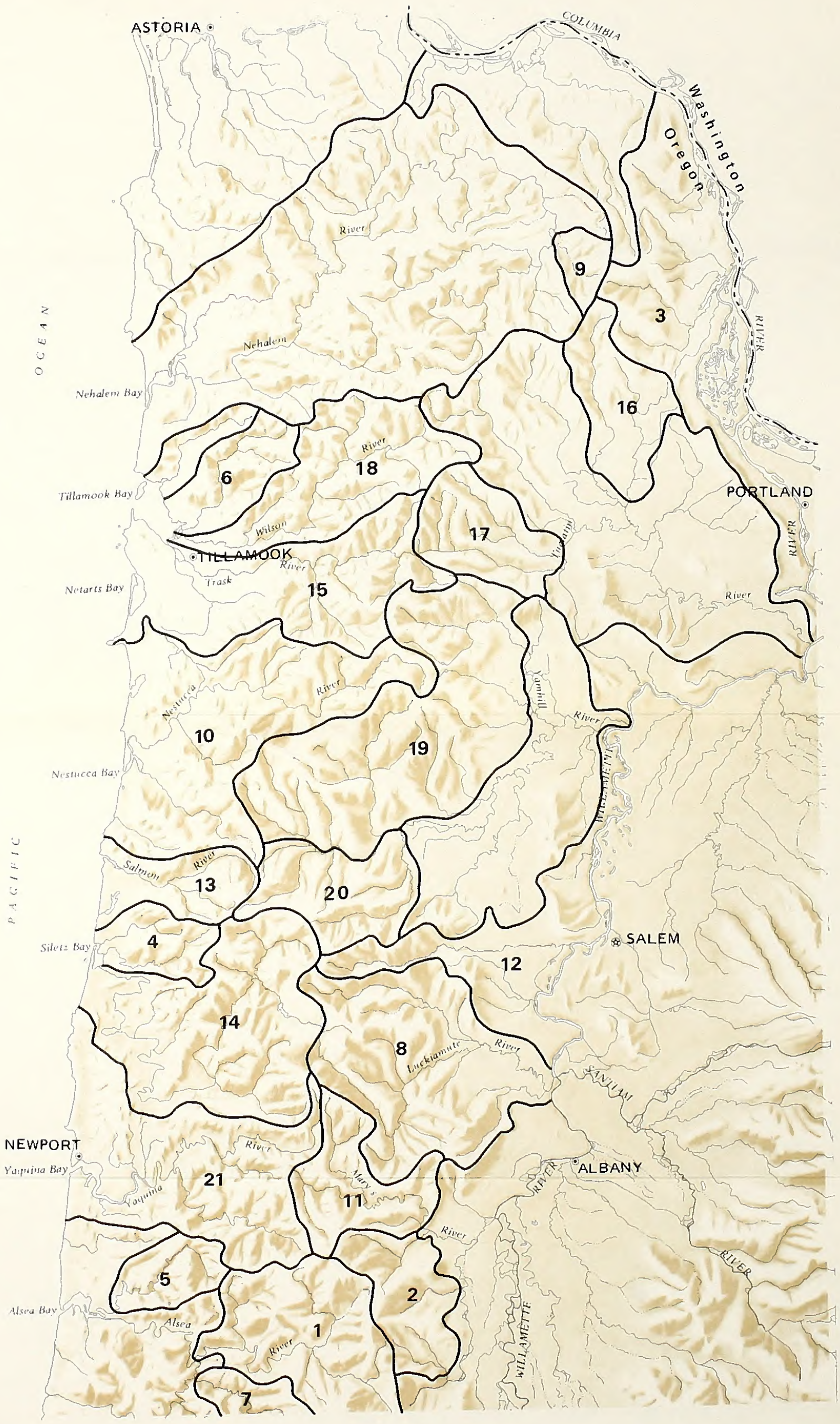
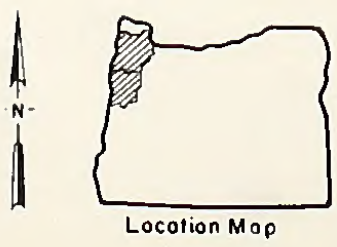
FIGURE 2-2



RELIEF & MAJOR WATERSHEDS





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RIVER BASINS CONTAINING BLM ADMINISTERED LAND

FIGURE 2-3

Numbers refer to Table 2-3 with names of basins.

SCALE
0 5 10 15 20 MILE
0 5 10 15 20 25 30 35 40 KM

VEGETATION

The WSSYUs are located in the Northwest Coastal Coniferous Sub-biome, which is the most densely forested region in the Coniferous Biome. Characterized by easy regeneration and rapid growth, it produces trees of impressive sizes. The lower vegetative layers are usually poorly developed except where open canopies encourage a lush understory of shrubs and herbaceous species. Additional information may be found in the BLM Timber Management-Final EIS-1975.

Terrestrial Vegetation

For purposes of this EIS, vegetation is generally described in terms of "zones" adapted from those identified by Franklin and Dryness in Natural Vegetation of Oregon and Washington (1973). A detailed description of each zone and plant community listed below may be found in that source or from data prepared in the Salem District. A complete list of common and scientific names for all plants discussed is available upon request.

Portions of three major vegetative zones, Sitka Spruce, Western Hemlock and Willamette Valley are found within the SYUs.

The Sitka Spruce Zone is usually found within a few miles of the coast from sea level to 500 feet elevation. In major coastal valleys or drainage areas, it may extend more than 10 miles inland. Approximately 2 percent of BLM-administered lands lie within the western hemlock, Sitka spruce, devils club, ladyfern community of this zone. Frequent associates to this plant community which are also important to the forest industry consist of Douglas-fir, western red cedar and red alder.

The Western Hemlock Zone, found throughout the SYUs, extends from the eastern edge of the Sitka Spruce Zone to the western edge of the Willamette Valley at all elevations. It is famous for its subclimax species, Douglas-fir, which is often the sole dominant tree in the forest. As a pioneer species, Douglas-fir normally constitutes a seral (successional) stage during the vegetative community development process. This zone encompasses six major plant communities with various associations of trees, shrubs and forbs relative to specific climatic conditions such as aspect, moisture, soil type and depth, etc. These communities are listed on a site moisture gradient from dry to wet:

a. Douglas-fir, ocean spray
b. Western hemlock, golden chinkapin
c. Western hemlock, Pacific rhododendron, salal
d. Western hemlock, Pacific rhododendron, Oregongrape
e. Western hemlock, swordfern, Oregon oxalis
f. Western red cedar, western maidenhair fern, ladyfern

There is less than 0.5 percent of BLM-administered lands in the western edge of the Willamette Valley Zone. Major species in association consist of Douglas-fir, grand-fir, bigleaf maple, California hazel and Columbia brome.

Riparian habitat occupies the transitional terrestrial areas from the water's edge to the better-drained slopes. Vegetation in these areas range from a few aquatic species and the hardwood-western red cedar-hemlock type, to the predominant Douglas-fir stand usually found on the slopes.

Habitat stratification for all forested land of the entire North Coast Area is depicted in Table 2-4. The North Coast Area includes all lands west of the Willamette River between the northern Lane County-line and the Columbia River. Acreages listed are a composite of all ownerships obtained from several sources (USFS; OSDF; OSDT) as well as the BLM forest inventory. The acreages of BLM-administered lands are shown for comparison.

Table 2-4 Existing Forest Habitat Stratification of Entire North Coast Area (Acres)

Habitat Age	BLM	All Lands
Grass/Forb (non-stocked and 0-7 years)	25,200	428,800
Brush/Seedling (8-15 years)	25,600	384,200
Pole/Sapling (16-45 years)	76,200	1,257,500
Young 2nd Growth (46-115 years)	81,700	627,900
Mature (116-195 years)	13,300	147,200
Old Growth* (196+ years)	5,700	51,600

* In addition, an estimated 6,100 acres of younger age stands contain a few older trees which also provide old-growth characteristics (See Table 3-8).

Source: USDI, BLM; USDA, FS; Oregon State Department of Forestry; Oregon State Department of Transportation (Parks and Recreation Branch)

Wetland and Aquatic Vegetation

Wetlands are those areas inundated by surface or ground water at a frequency sufficient to produce a saturated or seasonally-saturated soil condition. Examples of wetlands include marshes, swamps, bogs, wet meadows and natural ponds. Sedges, grasses, rushes, skunk cabbage, cattails and alge are typical wetland and aquatic plants.

Sensitive, Threatened and Endangered Plants

Endangered plants are those species that are in danger of extinction throughout all or a significant portion of their range. Threatened plant species are those that presently are not endangered but are likely to become so within the foreseeable future throughout all or a significant portion of their range. Sensitive plants are those species not yet officially listed but are undergoing a status review (see Glossary-Sensitive Species).

Botanical surveys for sensitive, threatened and endangered plants were conducted on the Salem District from 1978 through 1980 and are continuing. At present, there are no Federally-listed threatened or endangered plants in the EIS area. However, several species observed in the EIS area are currently under review for listing as threatened or endangered by the U.S. Fish and Wildlife Service (Table 2-5). The final status of these species will be determined as sufficient data are collected.

ANIMALS

Terrestrial Animals

Animal distribution, diversity and abundance are dependent on various factors: of primary importance is vegetation. Each vegetational zone described in the previous section contains a variety of plant communities which may be in different successional stages. Each successional stage has a unique structure and it is primarily this structure to which animal communities respond. The differences in communities, successional stages and structure provide habitat diversity and account for the variety of animals found in the planning area.

Successional stages are dynamic. They are always progressing toward their climax form and during this progression their animal components are also changing. A climax western hemlock forest supports a very different animal association than it did in its early successional stage several hundred years before. Progress toward climax can be curtailed at any point by outside influences, either natural or artificial. For instance, fire or logging may set back succession, and those animal species associated with the current stage will be replaced with those adapted to exist in the early successional stages.

Modifying or removing one particular stage, e.g., old growth, has a profound effect on those individuals and species occurring there. It is recognized that these effects do not stop with just those species, as the ecosystem as a whole is altered by the modification of one of its parts. Certain results may be harmful to some species and beneficial to others, but all are affected.

From the perspective of all ownerships, the progression toward climax in the SYUs has been halted and reversed primarily by planned timber management activities. In 1930, for example, most of the forest land acreage supported

Table 2-5 Sensitive Species Currently Under Review for Possible Listing

Scientific Name	Common Name	Candidate for 1/	Observations 2/
Anemone oregana	bog anemone		A
Aster curtus	white-topped aster	T	B
* Aster hallii	Hall's aster		B
Aster vialis	wayside aster	E	B
Cardamine pattersonii	Saddle Mountain bittercress	T	B
Castilleja levisecta	golden paintbrush	T	B
Cordylanthus maritimus	salt-marsh birds-beak	T	B
Cypripedium californicum	California lady's slipper	T	C
Cypripedium montanum	mountain lady's slipper	T	C
Darlingtonia californica	Darlingtonia pitcherplant	T	B
Delphinium leucophaeum	pale larkspur	T	B
Delphinium pavonaceum	peacock larkspur	T	B
Erigeron decumbens	Willamette daisy		B
* Erythronium revolutum	Coast fawn lily		A,B
Filipendula occidentalis	queen of the forest	T	A,B
Howellia aquatilis	howellia		B
Lathyrus holochlorus	thinned-leaved peavine	T	B
Lomatium bradshawii	Bradshaw's lomatium	E	B
* Lycopodium inundatum	bog club moss		B
* Mimulus tricolor	three colored monkey flower		B
Poa marcida	weak bluegrass	T	A,B
* Sagittaria latifolia	wapato		A,B
Saxifraga occidentalis	Saddle Mountain saxifrage	T	B
Sidalcea campestris	meadow sidalcea	T	A,B
Sidalcea cusickii	Cusick's checkermallow	E	B
Sidalcea nelsoniana	Nelson's sidalcea	E	B
Silene douglasii	Cascade Head catchfly	T	B
Sullivantia oregona	Oregon sullivantia	T	B

1/ Threatened (T), endangered (E), undesignated to date (blank).
2/ Observed; on BLM - A, on other lands in the SYUs - B, Unobserved - C.
* Designated Sensitive by Salem District Manager. All other species are designated as Bureau Sensitive Species by the Oregon State Director.

mature and old growth stands. Although skewed toward the young and middle stages, the present distribution (Table 2-6) has a greater diversity than that which existed under more "natural" conditions 50 years ago.

Table 2-6 Habitat Structure of Forest Lands in the SYUs (by percent)

Habitat Age	All Forest Lands	BLM	BLM Habitat as a Percent of All Forest Lands *
Grass/Forb (non-stocked and 0-7 years)	15	11	6
Brush/Seedling (8-15 years)	13	11	7
Pole/Sapling (16-45 years)	43	33	6
Young 2nd Growth (46-115 years)	22	36	13
Mature (116-195 years)	5	6	9
Old Growth (196+ years)	2	3	11

* This column indicates, for example, that while 3 percent of BLM land is old-growth, this is 11 percent of all old-growth in the defined area.

Source: USDI, BLM; USDA, FS; Oregon Department of Forestry; Oregon Division of Parks and Recreation.

The present diversity, however, is a transitory condition. The forest management activities that created the current diversity will, if carried to a logical conclusion, will result in a situation where the oldest successional stage is second growth (46-115 years old). Since approximately 92 percent of the SYUs is not controlled by the BLM, this is the situation that is most likely to occur on most of the area.

Habitat structure for all lands within the SYUs regardless of ownership or administration cannot be accurately calculated. However, based on data from a variety of sources, habitat structure for the entire area was estimated for all forest lands and is shown in Table 2-6. The "all lands" category consists of forest lands within Clatsop, Columbia, Tillamook, Washington,

Yamhill, Polk, Lincoln and Benton Counties. Total land is approximately 2.9 million acres. Bureau forest lands in the table approximate 228,000 acres. As illustrated in Table 2-6, habitat in both catagories is predominately in pole/sapling and young second growth. These two stages have the lowest habitat and animal diversity of all successional stages (Thomas 1979, p. 26).

Old-growth forests provide optimum habitat for a variety of animal species (See Appendix D), and are important to the entire forest ecosystem (Franklin et al. 1981).

Old-growth habitat totals 5,700 acres or 3 percent of Bureau-managed lands in the SYUs (Table 2-6). An additional 6,100 acres of younger-aged stands contain scattered old-growth trees, which provide marginal benefits to some old-growth animal species.

Other types of habitat exist and can be modified by forest management practices. Some of these habitats are unique because of their scarcity in the planning area. Table 2-7 lists habitat types, their quantity and trends.

Table 2-7 Habitats of the WSSYUs

Habitat Type	Quantity	Trend
Conifer Forest		
Grass/Forb NS/0-7 years	Moderate	Increasing
Brush/Seedling 8-15 years	Moderate	Increasing
Pole/Sapling 16-45 years	High	Increasing
Young 2nd growth 46-115 years	High	Increasing
Mature 110-195 years	Low	Declining
Old-growth 200+	Low	Declining
Hardwoods	Moderate	Declining
Riparian	Low	Stable
Dry meadows	Low	Declining
Wetlands	Low	Declining
Snags	Low	Declining
Talus slopes/cliffs	Low	Stable

Source: BLM District Personnel.

Of special concern are snags. Snags provide optimum habitat for 33 species and are used to some extent by 44 other species of birds and mammals in the SYUs (See Appendix D). That cavity-nesting birds feed on insects and play an important part in control of forest insect pests has been well reviewed by Thomas (1979).

Under natural conditions, snags occur throughout the forest as a result of fire, disease and other factors. Timber harvest practices generally result in their removal for safety and fire prevention. Currently, snags are only abundant in a few areas on BLM-managed lands in the SYUs.

Recent snag surveys by district personnel revealed an average of 0.26 snags per acre on coniferous forest lands under BLM-administration. At this level primary excavators are only at 10 percent of potential populations.

Hardwoods add greatly to habitat diversity both structurally and from a species standpoint. A number of animal species use this habitat for part of their needs (Maser and Franklin 1974). Few species are restricted to alder, but according to Maser (personal communication 1980) the white-footed vole feeds primarily on the leaves of the alder. Currently there are about 24,000 acres of merchantable hardwoods located on Bureau lands in the SYUs; an additional 1,300 acres of mixed unmerchantable hardwoods and brush has also been identified.

There are 29 species of amphibians and reptiles, 193 species of birds and 64 species of mammals that occur or probably occur in the planning area. Some species of animals are quite restricted in their habitat requirements, while others have a wide tolerance. For instance, the robin occurs in most habitat type while the northern spotted owl is much more restricted.

Appendix D lists those species of terrestrial vertebrates occurring in the planning area, some information on their habitat requirements and what is known of the status of their population and habitat.

Fish

Habitat conditions for fish have been degraded by past logging, road construction, fires and salvage treatments. As a result of recent timber management practices and reestablishment of vegetation, the overall condition of the fish habitat has improved. Streams are considered to have a specific carrying capacity for salmonids, producing similar annual numbers of young, provided habitats are not degraded and stocks have not been overfished (Allen 1969; McFadden 1969). It is estimated that streams in the SYUs are currently producing at 50 percent of optimum for native salmonids.

There are four species of salmonids that occur in the SYUs that are of major importance. Chinook salmon, found in larger streams, are only of moderate abundance, as are steelhead and cutthroat trout. Special concern has been expressed for coho salmon, whose population levels are depressed and

declining. Because of its importance to the sport and commercial fishery, efforts are being made by State and Federal agencies to rehabilitate coho salmon runs. Table 2-8 lists population and habitat data for these species.

Many other species of fish are present in the planning area. Sculpins, suckers, dace, squawfish and lampreys are some examples. These species have no direct commercial or sport value. Little infomation on populations is available. Some species may compete with trout and salmon for food and space, while others are used by the trout and salmon as food.

Table 2-8 Coldwater Fish Habitat and Populations 1/

Species	Miles	Condition of Habitat 2/				Habitat Trend	Current Population	Population Trend
		Excellent	Good	Fair	Poor			
Cutthroat	320	1%	41%	53%	5%	Improving	Moderate	Declining
Steelhead	130	2%	38%	55%	5%	Improving	Moderate	Increasing
Coho	128	< 1%	38%	58%	4%	Improving	Low	Declining
Chinook	33	1%	42%	53%	4%	Improving	Moderate	Declining

1/ Habitat miles, condition and trend are for BLM-administered lands only.
2/ Streams in excellent condition have riparian vegetation, abundant and diverse instream structure, numerous high quality pools, sediment-free bottom substrate, adequate spawning gravels and stable bank and channels. Streams in good to poor condition lack one or more of these characteristics.

Source: USDI, BLM URA Steps 3+4 Tables G8 - G13

Threatened and Endangered Animals

There are seven species of animals officially listed by the U.S. Fish and Wildlife Service and/or the State of Oregon as threatened or endangered that occur at least occasionally in the SYUs, although not necessarily on BLM-administered lands. Table 2-9 lists those species and their status.

The western spotted frog has been displaced from much of its former habitat in western Oregon by the bullfrog. While no intensive surveys have been done on Bureau-administered lands, it is possible that some spotted frogs occur in remote sites within the SYUs.

The California brown pelican is regularly observed along the Oregon coast in the summer and fall of the year (personal communication, Marshall 1980). The species is not known to breed in Oregon.

There have been sightings of what are believed to be Aleutian Canada geese near Pacific City in Tillamook County. The U.S. Fish and Wildlife Service call the sightings probable but unconfirmed (personnel communication, Bartonek 1980).

Peregrine falcons are occasionally seen in the coastal areas of the SYUs, but none are known to nest in the area.

The bald eagle is a regular inhabitant of the SYUs. There is one pair known to nest on BLM-administered land and another pair that nests adjacent to land under Bureau-administration in the SYUs.

The northern spotted owl is a permanent resident of the SYUs. Currently there are 26 known locations of owls on BLM-administered lands. An additional 48 locations have been recorded on lands of other ownership within the planning area.

The western snowy plover is known to occur in the coastal portions of the SYUs. They are generally associated with sandy beach type habitat. None have been found on BLM-administered lands in the Salem District.

No habitat considered critical under Section 7 of the Endangered Species Act of 1973 has been declared or nominated within the SYUs.

Table 2-9 Threatened and Endangered Species of the WSSYUs

Species	Federal Status	Oregon Status
Western spotted frog *Rana pretiosa*		T
California brown pelican *Pelecanus occidentalis californicus*	E	E
Aleutian Canada goose *Branta canadensis leucopareia*	E	E
Northern bald eagle *Haliaeetus leucocephalus alascanus*	T	T
Peregrine falcon *Falco peregrinus*	E	E
Western snowy plover *Charadrius alexandrinus nivosus*		T
Northern spotted owl *Strix occidentalis caurina*		T

T - Threatened
E - Endangered

RECREATION

Developed recreation sites on public land include Scaponia, Little Bend, Alder Glen, Dovre, Fan Creek, Alsea Falls, Elk Bend, Mill Creek and Missouri Bend (see Figure 1-1). Each site has facilities for overnight camping and/or picnicking. Annual use at the nine developed sites is approximately 15,500 visitor days, with about 70 percent attributable to day use and 30 percent to overnight use. Opportunities are also available for dispersed camping and picnicking throughout the SYUs.

Fishing is a major recreational activity in the SYUs. In localized areas, high quality stream fishing opportunities exist for resident trout, sea-run cutthroat trout, coho salmon, spring and fall chinook salmon and summer and winter steelhead. Fishing quality is affected by stream size and flow, the associated pool-to-riffle ratio and fishery population. Most stream fishing occurs in the Willamette, Nehalem, Columbia, Kilchis, Wilson, Trask, Nestucca, Yamhill, Siletz and Alsea Rivers and associated tributaries.

Hunting opportunities are available for big game, small game, upland game, waterfowl and furbearer trapping. Hunter success is affected by game population, ease of movement and shooting opportunities. The major hunting activity on public land is for deer and elk.

Many areas offer high quality opportunities for historic, botanic, zoologic and geologic sightseeing. Examples of high quality sightseeing areas include Lost Prairie, Alsea Falls, Valley of the Giants Outstanding Natural Area and a number of scenic overlooks.

Off-road vehicle (ORV) use in the SYUs is generally limited to existing roads and trails. In recent years this recreational use has rapidly increased. High quality ORV-use areas include the Keeler-Alston Powerline, Stony Mountain/Slide Mountain/High Heaven/Ball Bearing Hill, Dallas Watershed/Rickreall Ridge, Greasy Creek/Gleason Creek/ Crooked Creek and the South Fork Alsea River Drainage.

The proposed 90 mile Corvallis-to-the-Sea Trail would provide hiking and backpacking opportunities. About 22 miles of the proposed trail would cross public land.

Phase 1 of the Nationwide Rivers Inventory prepared by the Heritage Conservation and Recreation Service (HCRS) has identified six potential National wild, scenic or recreational rivers crossing public land within the SYUs. Table 2-10 lists these rivers, shoreline mileage and acreage within a one-half mile corridor.

Table 2-11 summarizes visitation attributable to major recreation activities in the SYUs. Total visitation includes use in the coastal region where public lands are limited. Recreational demand projections to 1990 are also displayed.

Table 2-10 Rivers Identified by the HCRS in the Nationwide Rivers Inventory

River	Approx. Shoreline Mileage		Approx. Corridor Acreage 1/	
	Total Length	Total BLM	Total	Total BLM
Alsea (Main stem)	53.5	0.6	17,120	489
Nehalem	114.0	2.5	36,480	680
Nestucca	37.6	10.0	12,032	3,370
Siletz	43.0	0	13,760	43
Trask (Main,North & South Forks)	30.4	2.8	9,728	1,282
Willamette	26.0	0	8,320	2

1/ Total corridor width is one-half mile (one-quarter mile on each side of the river).

Source: USDI, HCRS 1980; BLM Salem District personnel.

Table 2-11 Estimated Current and Projected Visitation Attributed to Major Recreational Activities

Activity	1975 Visitation Visitor Days/Year		1990 Demand Projection1/ Visitor Days/Year	
	Total	BLM	Total	BLM
Camping - Developed Site	2,219,100	4,600	2,927,600	6,100
Picknicking - Developed Site	3,155,100	10,900	3,989,000	13,900
Camping - Dispersed	739,700	59,000	975,900	77,700
Picnicking- Dispersed	1,051,700	136,700	1,329,700	175,100
Hunting (big game)	425,800	29,600	515,200	35,800
Hunting (upland game)	44,300	4,000	53,600	4,800
Fishing (salmon)	472,200	45,200 2/	502,900	48,100 2/
Fishing (steelhead)	213,900	33,500 3/	442,800	69,400 3/
Fishing (other)	190,300	7,600	443,400	17,800
Other Day Uses 4/	36,857,200	100,000	45,892,700	129,400
Total	45,369,300	431,100	57,072,800	578,100

1/ Based upon projections by Pacific Northwest River Basins Commission (1975) and Oregon Department of Transportation (1978).
2/ Includes ocean sport fishing for salmon reared in BLM-managed streams.
3/ Includes downstream fishing for steelhead reared in BLM-managed streams.
4/ Total area day use visitation includes urban and semi-urban activities. This use is not generally associated with forest lands administered by the BLM.

Source: USDI, BLM 1980.

CULTURAL RESOURCES

Federal agencies have been charged with responsibility for the cultural resources (see Glossary) on lands under their jurisdiction. Through a group of laws beginning with the Antiquities Act (1906), BLM has been mandated to identify, protect and enhance such resources on public lands. A number of procedures, including those specified in 36 CFR 800.4(a), were used to identify the cultural resources within the SYUs.

A survey of existing cultural resource information (Class I inventory) has been completed for the WSSYUs (Minor et al. 1980) and is available in the Salem District Office. All recorded cultural sites were identified through a compilation of the area's existing site record data.

The criteria used to assess the eligibility of identified cultural resources for inclusion in the National Register of Historic Places are described in 36 CFR 1202.6. Further, the BLM employs a cultural resource evaluation system to assess the relative value of a cultural site in terms of possible uses.

Archeologic Sites

No prehistoric sites have been recorded on public land within the SYUs. Little of the Coast Range has been field surveyed for archeologic resources due to its steep, heavily forested terrain.

The nature, density and distribution of potential sites are related to the area's accessibility, economic resources and nearness to major rivers and the ocean. White (1975) distinguishes between four types of Upper Willamette Valley sites based upon the environmental zones in which they are likely to occur (valley edge, narrow valley plain, primary flood plain and riparian). It is also possible that temporary, seasonal task sites exist at higher elevations.

Indian subsistence and settlement patterns indicate that campsites are likely to be located on relatively level ground such as benches, meadows, saddles and ridgetops. Areas near water would be expected to have campsites, although sites distant from water are also likely. Most trails were probably confined to ridgelines and to the larger river valleys. Sites associated with salmon fishing would be expected along rivers and streams flowing to the ocean. Sites associated with ritual or with personal spiritual quests might be expected at high elevations in the Coast Range.

Historic Sites

There are 98 inventoried historic sites on or near BLM-administered land within the SYUs. Of these, 48 are documented in historical records but remain unverified in the field. Most historic sites relate to settlement, transportation, military use and logging.

None of the historic sites on public land are currently listed on the National Register of Historic Places (see Glossary). One site, the Nehalem Divide Railroad Tunnel, has been identified as eligible for the National Register.

Historic sites are protected by the same stipulations as archeologic sites, and a thorough survey to identify them so they can be protected is accomplished prior to ground disturbance or ownership changes. The results of this intensive survey are documented in each site-specific environmental assessment.

Paleontologic Sites

While a majority of the known paleontologic sites are located on lands not administered by the BLM, their widespread occurrence indicates that vertebrate and invertebrate marine fossils underlie much of the northern portion of the Columbia SYU. Most of the identified formations are composed primarily of siltstone, sandstone and shale, with some concretions. Steere (1977) contains further information on the fossils of northwest Oregon.

While none of the reported paleontologic sites are unique, the fossils of the Cenozoic Era are important, both locally and regionally. All reports of fossil-bearing deposits are examined by qualified personnel to avoid destruction of such resources.

VISUAL RESOURCES

Visual resources are the land, water, vegetation, animals and the other features (as described in this chapter) that are visible on public lands. Visual resource management (VRM) objectives have been developed based on three factors (BLM Manual 8400). These factors are scenic quality, visual sensitivity and distance zone (see Glossary). Examples of highly scenic areas on public land include 22 waterfalls, the Nehalem Divide Tunnel, Big Canyon and Valley of the Giants Outstanding Natural Area. Among the 60 areas considered to be highly sensitive to landscape modification are public lands seen from the Nestucca access road, Willamina Creek access road, Little Sink Research Natural Area, Marys Peak Road and numerous recreation sites.

VRM classes specify management objectives and allow for differing degrees of modification. Objectives for each VRM class follow:

Class I: Provides primarily for natural ecological change (highest level of protection). Generally includes highly scenic and/or sensitive areas.

Class II: Changes in any of the visual resource basic elements (see Glossary) caused by a management activity should not be evident in the characteristic landscape. A change may be seen but should not attract attention (retention of scenic quality). Generally includes high to moderate scenic and/or sensitive areas.

Class III: Changes in the basic elements caused by a management activity may be evident in, but should remain subordinate to, the existing characteristic landscape (partial retention of scenic quality). Generally includes moderate scenic and/or sensitive areas.

Class IV: Changes may attract attention and be dominant landscape features but should reflect those basic elements inherent in the characteristic landscape (modification of scenic quality - lowest level of protection). Generally includes areas with moderate to low scenic quality that are seldom seen.

Figure 2-4 shows VRM classes as recommended through the visual resource inventory and evaluation of the existing environment.

WILDERNESS VALUES

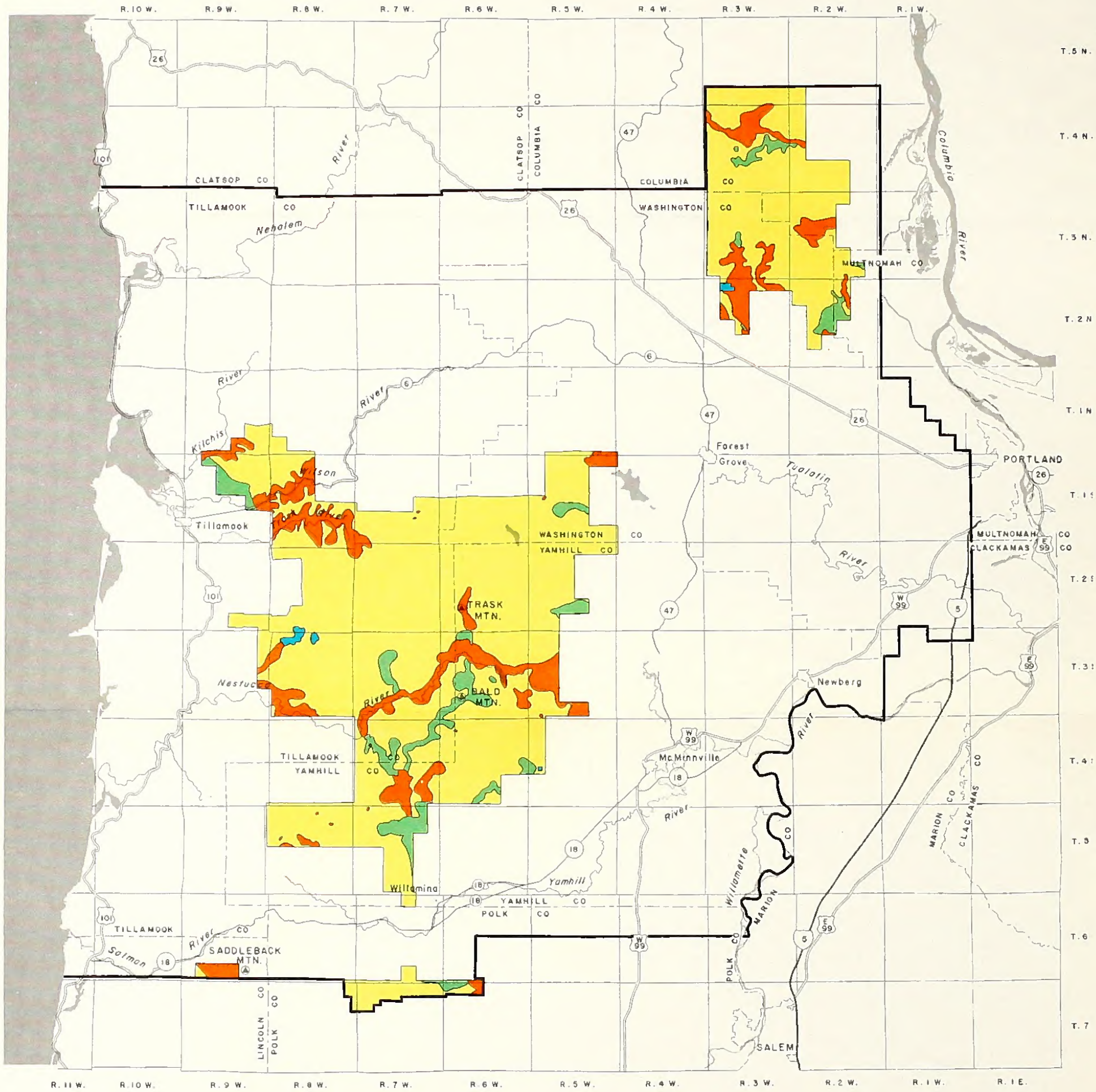
Under the terms of the Federal Land Policy and Management Act of 1976 (FLPMA), roadless areas of 5,000 acres or more that have wilderness characteristics are to be reviewed within 15 years for possible wilderness designation. The 1976 Act also states that in the event of inconsistency between it and the O&C Act insofar as they both may relate to management of timber resources, the O&C Act prevails. Accordingly, the wilderness review provisions do not apply to revested Oregon and California Railroad Grant lands suitable for sustained yield management as commercial timber lands.

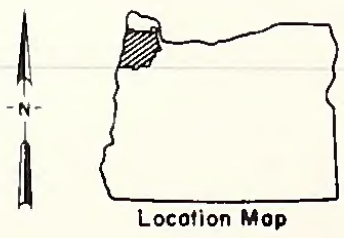
No areas within the SYUs are proposed wilderness study areas. The intensive wilderness inventory and accompanying maps for Oregon and Washington are available in the Oregon State Office.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Areas of Critical Environmental Concern (ACECs) are areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards (FLPMA section 103(a)). Designation of an area as an ACEC does not necessarily preclude development but rather ensures the protection of sensitive values in those cases where appropriate development may take place. Prior to designation, site-specific management prescriptions are developed for each proposed ACEC. Following designation, activity plans are prepared to translate the special management requirements into on-going on-the-ground implementation actions.

Of the 37 areas nominated for ACEC consideration during the Westside Salem District's planning process (see Table 2-12), 15 have been proposed for designation. The decision to designate any or all of these 15 areas as ACECs will be part of the Management Framework Plan decision for the SYUs, to be made following completion of this EIS (see page 1-18). The remaining 22 areas (Beck Road, Grassy Overlook, and 20 spotted owl areas) were found not to meet the criteria of importance, as described in the August, 1980 Final Guidelines for Areas of Critical Environmental Concern (USDI, BLM 1980).





U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

COLUMBIA SUSTAINED YIELD UNIT

Westside Salem Environmental Impact Statement Area

1981

SCALE

0 5 10 MILE

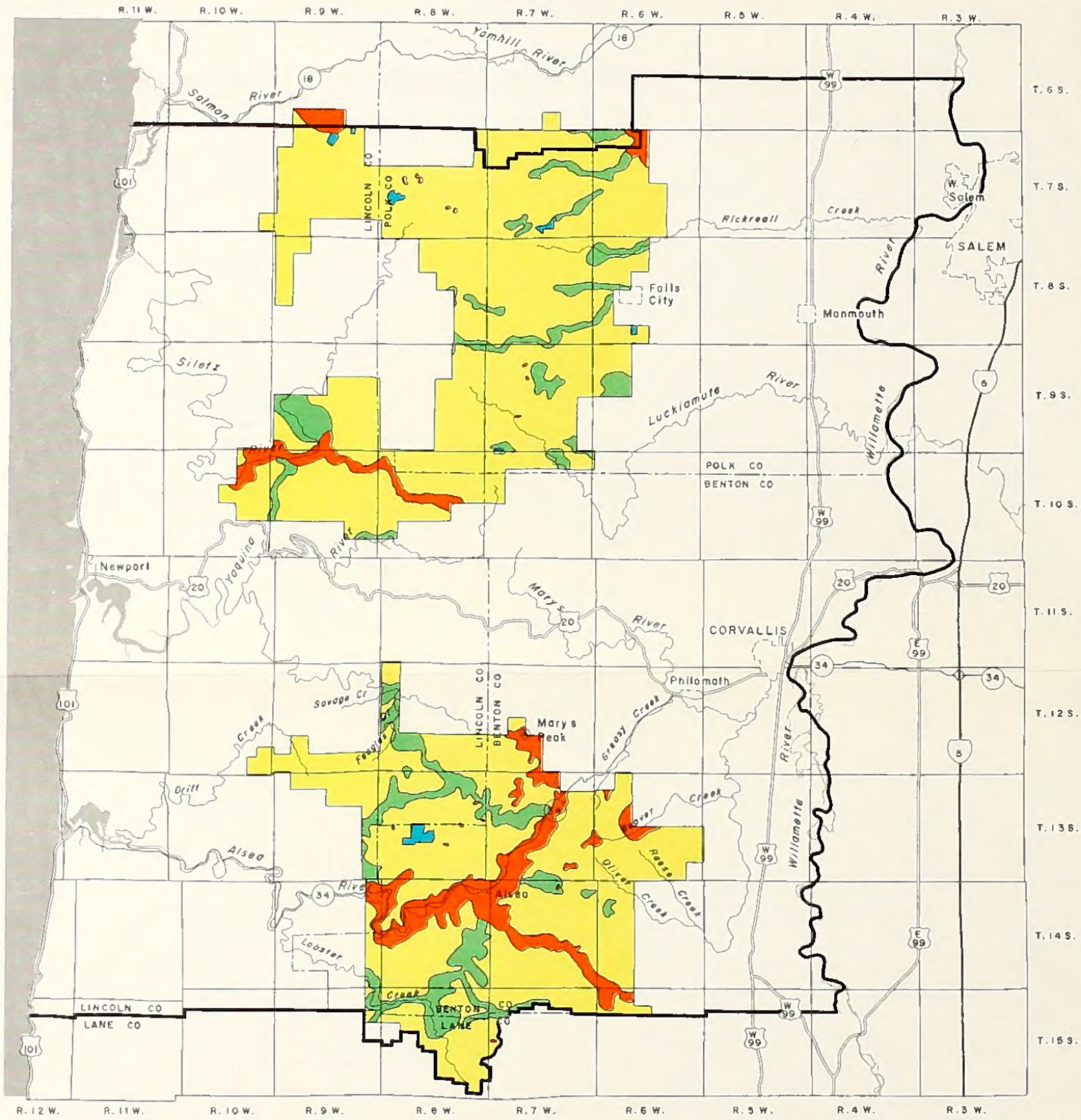
0 5 10 15 20 KM

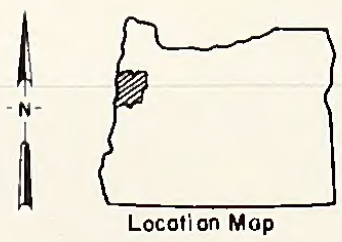
VISUAL RESOURCE MANAGEMENT CLASSES

LEGEND

- Class I
- Class II
- Class III
- Class IV

FIGURE 2-4a





U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

ALSEA-RICKREALL SUSTAINED YIELD UNIT

Westside Salem Environmental Impact Statement Area

1981

SCALE

0 5 10 MILE

0 5 10 15 20 KM

VISUAL RESOURCE MANAGEMENT CLASSES

LEGEND

- Class I
- Class II
- Class III
- Class IV

FIGURE 2-4b

Table 2-12 Nominated and Proposed Areas of Critical Environmental Concern

Site Name	Approximate Size (acres)	Description	Primary Resource Values	Remarks
PROPOSED FOR ACEC DESIGNATION				
1. Little Sink Research Natural Area	80	Douglas-fir on broken topography, slumps, ponds, natural disturbance	Botanic	Designated Research Natural Area
2. Saddleback Mountain	110	Last old-growth Pacific Silver fir/western hemlock stand on BLM land in the Oregon Coast Range	Botanic	Proposed Research Natural Area
3. Grass Mountain	730	Grass bald complex, young growth Noble fir and Douglas-fir	Botanic	Proposed Research Natural Area
4. High Peak - Moon Creek	1,520	Old-growth Douglas-fir and western hemlock	Botanic	Proposed Research Natural Area
5. The Butte	40	Ecotone between the Willamette Valley and Coast Range	Botanic	Proposed Research Natural Area
6. Valley of the Giants	296	Large, old-growth Douglas-fir and western hemlock	Botanic, Wildlife	Existing Outstanding Natural Area (47 acres) Proposed addition to the ONA (249 acres)
7. Yaquina Head	18	Rocky coastal headland with unique plant community	Scenic, Botanic	Existing ONA
8. Little Grass Mountain	42	Grass bald complex, Douglas-fir/western hemlock	Scenic, Botanic, Wildlife	Proposed ONA
9. Marys Peak	105	Douglas-fir/western hemlock, Noble fir, grass balds	Scenic, Botanic	Proposed ONA
10. Big Canyon	280	Old-growth Douglas-fir and western hemlock	Scenic, Botanic	Proposed ONA
11. Nestucca River	5,280	High quality sightseeing and fishing opportunities	Scenic	Proposed recreation lands
12. Elk Creek	1,935	Active bald eagle nest sites	Wildlife	
13. Rickreall Ridge	180	Relict vegetation	Botanic	
14. Lost Prairie	60	Wet bog/meadow with cedar, hemlock and western white pine	Botanic, Wildlife	
15. Sheridan Peak	305	Sensitive plant species	Botanic	
NOMINATED BUT NOT PROPOSED FOR ACEC DESIGNATION 1/				
1. Beck Road	20	Douglas-fir/Oregon white oak woodland	Botanic	
2. Grassy Overlook	80	Sensitive plant species	Botanic	
3. Spotted Owl Areas (20)	48,000	Northern spotted owl habitat	Wildlife	

1/ Two identification criteria (relevance and importance) derived from the Federal Land Policy and Management Act (1976) were applied to evaluate all areas nominated for ACEC designation. All areas nominated but not proposed for designation failed to meet the criteria of importance, as described in the August, 1980 Final Guidelines for Areas of Criticial Environmental Concern (USDI, BLM 1980).

Table 2-12 also indicates that a number of the proposed ACECs are also designated or proposed for other protective designation (see section on Special Areas).

SPECIAL AREAS

The 80-acre Little Sink Research Natural Area (see Glossary) was designated by BLM in 1973 to preserve a foothill Douglas-fir forest on the western edge of the Willamette Valley. Its primary value is its broken topography with slumps, ponds and recent natural disturbances. Four additional sites (Saddleback Mountain, Grass Mountain, High Peak - Moon Creek and the Butte) are proposed by the BLM for Research Natural Area designation. All five areas are also proposed by the BLM as Areas of Critical Environmental Concern.

The Valley of the Giants Outstanding Natural Area (see Glossary) is a 47-acre tract designated by BLM in 1976. This area was established because of its exceptional undisturbed stand of mature Douglas-fir and hemlock. An additional 249 acres are proposed for an addition to the existing Outstanding Natural Area. The Yaquina Head Outstanding Natural Area was designated by Congress in 1980. Three other areas (Big Canyon, Marys Peak, and Little Grass Mountain) are proposed for Outstanding Natural Area status. All five areas are also proposed Areas of Critical Environmental Concern.

Six sites (Yaquina Head, Little Sink, Saddleback Mountain, Haskins Creek, Moon Creek and Table Mountain) on public land within the SYUs have been identified by the National Park Service (NPS) as potential National Natural Landmarks (Chilcote et al. 1976; Easterbrook and Marsh 1978). Designation of a site as a National Natural Landmark (see Glossary), under the program administered by the NPS is not a land withdrawal and would not affect BLM jurisdiction to manage the area. With the exception of Haskins Creek and Table Mountain, these areas are also proposed Areas of Critical Environmental Concern. Recent field surveys indicate that old-growth values no longer exist in the Haskins Creek area. Except for a stream buffer, all commercial timber has been harvested on the Haskins Creek tract.

Three areas (Nestucca River, North Fork and South Fork Alsea River) are proposed by the BLM for designation as recreation lands (see Glossary). These areas offer a number of outstanding recreation opportunities. The Nestucca River proposed recreation lands is also a proposed Area of Critical Environmental Concern.

SOCIOECONOMIC CONDITIONS

The public lands in the SYUs occupy portions of 10 counties (see Table 1-1), however, discussion of socioeconomic conditions is limited primarily to the seven counties identified in Table 2-13. These seven counties together are termed the EIS area. The management of the public lands involved would generally have inconsequential effects on the three counties omitted -- Clatsop, Multnomah and Lane Counties. Consequential effects on the populations of these counties are treated specifically.

The EIS area is divided by the Coast Range into an eastern section with a larger and more dispersed population on the fringe of the metropolitan areas of the Willamette Valley and a western section with a smaller population concentrated in a narrow belt along the coast. A few towns dependent on timber production are scattered through the Coast Range.

The population of the EIS area now exceeds a half million people, as shown in Table 2-13, with most of this population residing in the eastern part of the area. The population of the two western counties, Tillamook and Lincoln, amounts to 11 percent of the total. Population growth over the last two decades has been rapid for the area as a whole. Population growth rates in the two western counties recovered in the 1970's from low or negative growth rates experienced during the 1960's.

Table 2-13 Population, 1960-1980

County	1960	1970	1980	Annual Growth Rate 1960-70	Annual Growth Rate 1970-80
Benton	39,165	53,776	68,078	3.2	2.4
Columbia	22,379	28,790	35,704	2.6	2.2
Lincoln	24,635	25,755	35,315	0.4	3.2
Polk	26,523	35,349	45,201	2.9	2.5
Tillamook	18,955	18,034	21,170	-0.5	1.6
Washington	92,234	157,920	245,684	5.5	4.5
Yamhill	32,478	40,213	55,230	2.2	3.2
Total	256,369	359,837	506,387	3.4	3.5

Source: Census of Population, years indicated.

Washington County has the largest population in the area (49 percent of the total), and has accounted for a large part of the population growth. Population growth rates in the rest of the area averaged 2.1 percent annually during the 1960's and 2.6 percent in the 1970's. The 1980 population excluding Washington County was 260,703.

Table 2-14 shows labor force and employment data averaged over the years 1976-1979. Timber production including the pulp, paper and board industry, constitutes about 29 percent of manufacturing employment and about 9 percent of total wage and salary employment in the area as a whole. Omitting Washington County, where other manufacturing activity overshadows timber production, the timber industry in the rest of the area amounts to 59 percent of manufacturing employment and 15 percent of total wage and salary employment.

During the years 1976-1979 the EIS area unemployment rate of 6.2 percent was less than the State average of 7.6 percent. Excluding Washington County, the unemployment rate for the rest of the area averaged 7.0 percent, still below the State average. Columbia, Lincoln and Tillamook counties which are more sparsely populated and timber dependent, had higher unemployment rates.

Table 2-14 Labor Force and Employment, Average 1976-79

Category	Area Total	Benton	Columbia	Lincoln	Polk	Tillamook	Washington	Yamhill
Civilian Labor Force	197,540	27,480	15,020	14,608	1/	8,398	1/	23,652
Unemployment	12,333	1,668	1,355	1,062	1/	652	1/	1,632
Unemployment Rate	6.2	6.1	9.0	7.3	1/	7.8	1/	6.9
Total employment	185,207	25,812	13,665	13,546	1/	7,746	1/	22,020
Wage and Salary Employment 2/	141,336	24,148	7,950	10,410	8,153	5,568	70,502	14,605
Manufacturing	43,812	3,562	2,705	2,052	3,274	1,538	25,903	4,778
Timber 3/	12,525	1,956	2,190	1,540	1,559	1,112	1,948	2,220
Non-manufacturing	97,524	20,586	5,245	8,358	4,879	4,030	44,599	9,827

1/ County estimate used to obtain area total was not considered sufficiently accurate to show separately.

2/ Omits data for proprietors which is not available for individual industries on a regular basis.

3/ Includes lumber and wood products (SIC 24), and pulp, paper and board (SIC 26). Omits workers in forest management activities classified as forestry, business services and other industries.

Source: Oregon Department of Human Resources, Oregon Resident Labor Force, Unemployment, and Employment; Covered Employment and Payrolls; personal communication 11/21/80.

As shown in the following figures, during the past year unemployment has increased, partly due to lower wood products employment.

County	Unemployment Rate Jan. 1981	Unemployment Rate Jan. 1980	Change between Jan. 1980 and Jan. 1981 (Number of workers) Unemployment	Wood Products Employment
Benton	7.8	6.9	+530	-540
Columbia	12.5	10.4	+370	-410
Lincoln	10.4	10.2	+190	- 50
Polk *	NA	NA	NA	NA
Tillamook	13.6	11.4	+270	-290
Washington *	NA	NA	NA	NA
Yamhill	10.4	7.8	+840	-340

* Figures not available.

Personal income and labor and proprietors' income are shown in Table 2-15. Personal income is a measure of the economic welfare of the residents of an area and is generally considered to be closely related to their social well-being. Labor and proprietors' income, which represents worker earnings, is shown here as the basis for later calculations of the effect of changes in production on income. Per capita personal income for the area as a whole was below the State average in all years shown. Omitting Washington County, per capita income for the rest of the area was only $6,973 compared with a State average of $8,076 in 1978.

Estimates of earnings per worker in all industries have been calculated by dividing total labor and proprietors' income (Bureau of Economic Analysis data) by total employment (Oregon Department of Human Resources). Earnings per worker in 1978 for all industries and for the timber industry (including pulp, paper and board) based on covered employment data (Oregon Department of Human Resources 1980) were as follows:

County	All industries	Timber
Benton	$11,421	$15,558
Columbia	13,885*	18,630
Lincoln	10,143	17,414
Polk	9,952*	16,754
Tillamook	12,746	15,966
Washington	14,059	14,642
Yamhill	10,402	16,974

* Adjusted for place of work.

Table 2-15 Personal Income and Labor and Proprietors' Income, 1976-78

County	1976	1977	1978
	Total Personal Income (in thousands)		
Benton	$ 313,912	$ 369,626	$ 424,916
Columbia	204,160	231,038	249,472
Lincoln	165,096	198,593	225,441
Polk	209,994	243,237	281,289
Tillamook	107,036	126,886	148,594
Washington	1,395,718	1,656,403	1,960,677
Yamhill	268,986	314,994	364,298
Area Total	$2,664,902	$3,140,777	$3,655,687
	Total Labor and Proprietors' Income (in thousands) 1/		
Benton	$ 222,257	$ 269,643	$ 314,182
Columbia	108,471	123,288	137,308
Lincoln	104,050	127,892	146,562
Polk	111,955	124,566	148,659
Tillamook	72,806	86,724	103,880
Washington	765,754	971,459	1,230,722
Yamhill	172,429	204,008	239,974
Area Total	$1,557,722	$1,907,580	$2,321,287
	Per Capita Personal Income (in dollars)		
Benton	$ 4,987	$ 5,686	$ 6,454
Columbia	6,300	7,085	7,649
Lincoln	5,870	6,577	7,205
Polk	5,232	5,647	6,438
Tillamook	5,767	6,565	7,464
Washington	7,098	7,991	9,075
Yamhill	5,873	6,642	7,344
Area Average	$ 6,276	$ 7,059	$ 7,962
State Average	$ 6,419	$ 7,207	$ 8,076

1/ Labor and proprietors' income is presented here by place of work in contrast to the personal income data which is by place of residence. It is representative of work force earnings only and excludes dividends, interest, rents and transfer payments which are included in personal income.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 1980.

Timber Industry

The economic importance of the timber industry to the counties in the EIS area is shown in Table 2-16. Workers' earnings which are spent locally generate additional local income. The process by which additional income is created through successive rounds of expenditures following the initial receipt of income by a specific economic sector is called a multiplier effect. Estimates of the total income (earnings) generated in local areas due to the multiplier effect on workers' earnings in the timber industry are shown in the table. These earnings estimates were divided by average earnings per worker to estimate the total employment generated.

Earnings and employment generated by BLM harvests in the timber industry and in the local area overall are shown in Table 2-17. The estimates are based on harvest data for the years 1975-1977. Timber cut from BLM-administered lands provides employment in the timber industry at three stages: when timber is logged, when logs are manufactured into wood products, and when logs and wood chips and other residues from lumber and plywood mills are made into pulp, paper and board. Employment estimates for these three elements are displayed in Table 2-17.

According to these estimates, timber industry employment generated by BLM harvests amounts to about 7 percent of timber industry employment and accounts for about 1.5 percent of the total earnings of labor and proprietors in the seven-county area.

In some local communities, BLM harvests account for as much as 25 percent of timber industry log supplies (and an equivalent amount of timber industry employment). Communities which were dependent on BLM harvests for 10 to 25 percent of their log supplies during the 1975-77 period included:

Community	County	Community	County
Dawson	Benton	Independence	Polk
Philomath	Benton	Valsetz	Polk
Dallas	Polk	Sheridan	Yamhill
Grand Ronde	Polk	Willamina	Yamhill

These estimates were made by comparing receipts of BLM logs (1975-77 average) with total log use estimated from timber processing employment data (Oregon Department of Economic Development 1978) assuming 5 workers per million board feet log use.

Fisheries

The fish populations dependent on the rivers and estuaries in the EIS area are a significant economic resource. Table 2-18 shows the income and employment generated in the coastal regions of Washington and Oregon by the commercial fishery, and that generated in the local area by sport fishing activity.

Table 2-16 Earnings and Employment Generated by the Timber Industry 1/, 1978

Item	Benton	Columbia	Lincoln	Polk	Tillamook	Washington	Yamhill
Worker earnings in the timber industry 2/	$32,438,000	$40,389,000	$26,016,700	$25,835,200	$19,223,200	$30,719,800	$39,209,500
Earnings multiplier 3/	2.554	1.358	2.153	2.190	1.595	2.069	2.380
Total earnings generated	$82,831,000	$54,867,000	$56,015,000	$56,572,000	$30,661,000	$63,553,000	$93,310,000
Av. earnings per worker - all industries 4/	$ 11,421	$ 13,885	$ 10,143	$ 9,952	$ 12,746	$ 14,059	$ 10,402
Total employment generated	7,253	3,952	5,523	5,684	2,406	4,520	8,970
Percent county total	26%	40%	38%	28%	30%	5%	39%

1/ Includes lumber and wood products (SIC 24) and pulp, paper and board (SIC 26) industries. Omits workers in forest management activities classified as forestry, business services, and other industries.

2/ Earnings in employment covered by unemployment insurance. Oregon Department of Human Resources, 1980

3/ USDI, BLM (DYRAM) 1978b. Multipliers shown are composites of industry multipliers for SIC 24 and SIC 26 adjusted by a factor of 1.16 to reflect earnings of proprietors omitted from earnings in covered employment. For basis, see Appendix I, Jackson-Klamath FEIS (USDI, BLM 1979b).

4/ Total earnings generated is divided by average earnings in all industries to estimate the total employment generated. This estimation method tends to overstate employment slightly because worker earnings in the timber industry which accounts for the major part of the total income generated are substantially above average earnings.

Table 2-17 Employment and Earnings Generated by BLM Timber Harvest
(Based on 1975-77 average harvest)

Item	Benton	Columbia	Lincoln	Polk	Tillamook	Washington	Yamhill
Timber harvest (MM bd. ft.) 1/	24.444	.369	15.547	15.385	40.881	-	18.438
Logging employment ratio 2/	1.42	1.78	1.42	1.78	1.78	1.78	1.78
Logging employment	35	1	22	27	73	-	33
Timber consumption (MM bd. ft.) 1/	28.912	.028	3.998	35.593	9.109	7.853	28.918
Employment ratio 2/	4.75	4.00	4.75	4.93	4.50	4.50	4.50
Other wood products employment	137	-	19	175	41	35	130
Pulp, paper and board employment 3/	8	70	61	-	-	21	26
Employment in timber industry	180	71	102	203	114	56	189
Percent county total	9%	3%	7%	13%	10%	3%	9%
Av. earnings/timber worker (1978) 4/	$15,558	$18,630	$17,414	$16,754	$15,966	$14,642	$16,974
Earnings in timber industry (x 1,000)	$ 2,801	$ 1,318	$ 1,777	$ 3,399	$ 1,816	$ 825	$ 3,207
Multiplier 5/	2.554	1.358	2.153	2.190	1.595	2.069	2.380
Total earnings generated (x 1,000)	$ 7,154	1,790	$ 3,827	$ 7,443	$ 2,897	$ 1,707	$ 7,633
Percent 1978 county total	2%	1%	3%	5%	3%	6/	3%
Av. earnings/worker - all industries	$11,421	$13,855	$10,143	$ 9,952	$12,746	$14,059	$10,402
Total employment generated	626	129	377	748	227	121	734

1/ BLM, WS PAA, 1979. Timber harvest consumed outside the area is omitted.
2/ BLM, WS PAA, 1979. 1976 employment ratios for lumber mills and plywood mills developed by Wall (1979) weighted by respective shares of 1976 log consumption in county from Howard and Hiserote 1978. Adjusted from Scribner long log to short log basis.
3/ Estimated by ratio of industry employment in county to total log consumption in EIS area.
4/ Oregon Department of Human Resources, personal communication 11/13/80.
5/ From Table 2-16.
6/ Less than 0.5 percent.

Table 2-18 Local 1/ Income and Employment Generated by the Commercial Fishery and the Trip Expenditures of Sport Anglers (Income in thousands of 1975 dollars)

Activity	Income 1975	Income 1990	Employment 1975	Employment 1990
		ALL HABITAT IN EIS AREA		
Commercial fishery:				
Coho salmon	$ 4,752.3	$ 5,797.8	471	575
Chinook salmon	4,195.4	5,118.4	373	455
Total	$ 8,947.7	$10,916.2	844	1,030
Sport fishing:				
Salmon	$ 3,230.1	$ 3,940.7	530	647
Steelhead	1,463.1	1,785.0	240	293
Other fish	470.1	573.5	77	94
Total	$ 5,163.3	$ 6,299.2	847	1,034
Combined total	$14,111.0	$17,215.4	1,691	2,064
		PUBLIC LANDS HABITAT IN EIS AREA		
Commercial fishery:				
Coho salmon	$ 566.3	$ 690.9	56	68
Chinook salmon	314.1	383.2	28	34
Total	$ 880.4	$ 1,074.1	84	102
Sport fishing:				
Salmon	$ 309.1	$ 377.1	51	62
Steelhead	229.2	279.6	38	46
Other fish	18.9	23.1	3	4
Total	$ 557.2	$ 679.8	92	112
Combined total	$ 1,437.6	$ 1,753.9	176	214

1/ Estimates for the commercial fishery include total activity generated in Washington and Oregon of which an unknown portion occurs in the EIS area.

Source: USDI, BLM 1979b

The estimates for the commercial fishery are based on catch estimates in pounds for Washington and Oregon of:

	All Habitat in EIS Area		Public Lands Habitat	
	1975	1990	1975	1990
Coho salmon	4,444,751	5,422,596	529,611	646,125
Chinook salmon	2,915,930	3,557,435	218,336	266,370

The 1990 catch estimates are based on projected increases to 1985 in the Pacific Coast salmon fishery made by the National Marine Fisheries Service (1974).

The sport fishing estimates represent economic activity generated in the local area by the trip expenditures of anglers based on the angler-day estimates shown in Table 2-11 (Recreation).

Income and employment was estimated by use of an input-output model for Tillamook County (Ives and Youmans 1978) and angler expenditure estimates from the 1975 National Survey of Hunting-Fishing and Wildlife Related Recreation (USDI, Fish and Wildlife Service 1978). Estimates of earnings per worker in each industry derived from 1975 covered employment data for the state (Oregon Employment Division, 1976) were used to estimate employment.

Terrestrial Wildlife

Wildlife in the EIS area provides the basis for quantifiable amounts of hunting and trapping activity. Non-consumptive wildlife uses also generate significant values which have been included in dispersed recreation.

Local income and employment generated by hunting activity are shown in Table 2-19 for the years 1975 and 1990.

Fur trapping in fiscal 1978 yielded about $185,700 to trappers in the EIS area (reported fur catch valued at average fur prices) (Oregon Department of Fish and Wildlife 1980). Assuming the fur catch on BLM-administered lands in each county was proportional to BLM's share of total land area, the yield from BLM lands amounted to $11,800.

General Recreation

Local income and employment generated by recreational visits to sites or areas of the type provided by BLM (apart from those related to wildlife or fish) are shown in Table 2-20. These estimates are based on the recreation visitation estimates (Table 2-11).

Table 2-19 Local Income and Employment Generated by Hunting Activity, 1975 and 1990 (Income in thousands of 1975 dollars)

Hunting Activity	Income 1975	Income 1990	Employment 1/ 1975	Employment 1/ 1990
		ENTIRE EIS AREA		
Big game	$ 3,124.1	$ 3,780.2	513	621
Upland game	102.2	123.7	17	20
Total	$ 3,226.3	$ 3,903.9	530	641
		PUBLIC LANDS IN EIS AREA		
Big game	$ 260.8	$ 315.6	43	52
Upland game	9.2	11.1	2	2
Total	$ 270.0	$ 326.7	45	54

1/ Employment estimates adjusted to reflect indirect activities.

Source: USDI, BLM 1979b.

Table 2-20 Local Income and Employment Generated by General Recreation Activity, 1975-1990 (Income in thousands of 1975 dollars)

Type of Activity	Income 1975	Income 1990	Employment 1/ 1975	Employment 1/ 1990
		ENTIRE EIS AREA		
Camping - developed sites	$ 3,401.9	$4,488.0	558	737
Picnicking - developed sites	10,191.0	12,884.3	1,673	2,115
Dispersed recreation	2/	2/	2/	2/
Total	$13,592.9	$17,372.3	2,231	2,852
		PUBLIC LANDS IN EIS AREA		
Camping - developed sites	$ 7.1	$ 9.3	1	2
Picnicking - developed sites	35.1	44.9	6	7
Dispersed recreation	$ 955.1	$ 1,234.7	157	203
Total	$ 997.2	$ 1,288.9	164	212

1/ Employment estimates adjusted to reflect indirect activities.
2/ Estimates for dispersed recreation in the whole EIS area were not made. The bulk of this activity occurs near urban centers and differs substantially in character from that occurring on public lands.

Source: USDI, BLM 1979b.

Public Finances

Payments are made to State and local governments from land management revenues and, in a minor amount, from appropriations. In the EIS area, such payments originate from O&C lands and other BLM-administered lands (public domain). Most of the revenues derived from these lands are from timber sales.

Fifty percent of the revenue from all O&C lands in the State are distributed among the counties with O&C lands in proportion to the 1915 assessed value of the O&C lands in each county. Total O&C revenues for the fiscal year ending September 30, 1980 were $195,214,025 of which $25,584,537, or 13 percent, came from lands administered by BLM within the EIS area. Table 2-21 shows the importance of the O&C revenue distribution to individual counties in terms of property tax equivalents. The table also indicates the wide year-to-year variations in O&C revenues caused by the variations in harvest rates and prices. O&C timber sales in WSSYUs, in fiscal 1980, were $43,912,148 and total O&C sales were $333,102,471, however, timber purchasers have 3 years in which to harvest and pay for contracted timber. Poor market conditions have caused a backlog of over $700 million in uncut timber to accumulate on O&C lands.

A net of 4 percent of revenues from public domain lands is remitted to state governments. These revenues in Oregon are distributed to counties on the basis of total land areas for the benefit of county roads and bridges. Total revenues from such lands in the EIS area were $3,740,236 in FY 1980 resulting in the distribution of minor amounts among Oregon's 36 counties.

Local Income Attributable to BLM-Administered Lands

In summary, the principal sources of local personal income arising from lands administered by BLM in the EIS area are:

Timber	$32,090,000
Fisheries (including sports)	1,438,000
Hunting and trapping	282,000
Other recreation	998,000
	$34,807,000

Local income from fisheries includes income from commercial fishing in other parts of Oregon and Washington which could not be separately estimated. These amounts omit the in-lieu tax payments and other BLM-generated revenues accruing directly to the local governments in the area.

Social Concerns

Timber, as the main economic support of the local economy, greatly influences social attitudes and concerns of residents. Individual economic welfare is often closely related to the welfare of the timber industry. The current depression in the local economy has raised concern about the timber industry.

Table 2-21 O&C Revenue Distribution to Counties Expressed as Property Tax Rate Equivalent and as Percent Supplement To Total Levy, Fiscal Years 1977-1980

County	Amount per $1,000 Assessed Value 1/				Percent Supplement to Levy 2/			
	1977	1978	1979	1980	1977	1978	1979	1980
Benton	$3.36	$2.26	$2.03	$2.05	21.9	12.3	12.4	10.5
Clackamas	1.69	1.17	1.01	.90	6.8	5.4	5.5	4.6
Columbia	2.20	1.77	1.86	1.86	15.2	12.7	13.0	11.7
Coos	6.59	5.32	4.81	4.59	30.9	31.9	29.0	25.3
Curry	13.27	9.81	8.38	7.09	120.2	102.1	92.9	109.2
Douglas	14.47	12.44	11.59	11.50	90.0	110.3	103.8	79.5
Jackson	9.78	6.90	5.85	5.51	50.5	39.3	41.2	33.0
Josephine	18.23	11.78	10.04	9.56	119.1	74.4	89.8	63.0
Klamath	2.47	1.85	1.73	1.68	17.3	13.4	13.7	11.7
Lane	3.92	2.91	2.48	2.36	17.1	14.1	13.6	11.6
Lincoln	0.45	0.40	0.33	0.31	3.4	2.5	2.2	1.6
Linn	1.77	1.39	1.37	1.30	9.4	8.2	8.5	7.1
Marion	0.62	0.43	0.39	0.36	2.6	2.0	2.0	1.7
Multnomah	0.13	0.09	0.08	0.08	0.5	0.4	0.4	0.4
Polk	3.91	2.75	2.43	2.41	16.2	13.6	13.1	12.2
Tillamook	1.38	1.14	1.03	0.93	8.2	7.7	6.4	8.7
Washington	0.19	0.13	0.11	0.10	0.8	0.6	0.6	0.5
Yamhill	1.09	0.75	0.67	0.64	4.9	3.7	3.6	3.1
Average	3.01	2.19	2.54	1.81	13.6	10.9	10.9	9.5

1/ Represents county O&C distribution for fiscal year (ending September 30) divided by total assessed value (in thousands) on January 1 of same calendar year.

2/ Represents O&C distribution as percent of total property tax levy for following year, e.g., FY 1977 distribution as percent of 1977-78 levy.

Source: USDI, BLM 1978a. BLM Facts-Oregon and Washington, 1979, 1980; Oregon Dept of Revenue, Oregon Property Tax Statistics, 1978; Oregon Dept. of Revenue, Dick Yates, telephone conversations, April 15, 1980, June 24, 1980; Oregon Department of Revenue, Vinh Ninh, telephone conversation, April 13, 1981.

The fluctuations of the industry have required people to adjust to changes in their welfare. The expectation of a major reduction in the timber supply (and employment) in one or two decades is likely to increase concern about the timber supply.

The seasonal variations in timber industry employment and the longer fluctuations in employment attributable to market conditions have produced a kind of dual work force in the industry consisting of a core of stable, senior workers and a peripheral group of workers who "float" in and out of

the industry in response to the higher pay (Stevens 1976). In the woods, sharp social distinction is drawn between workers in logging and those in forest management activities. Pay scales differ widely between these groups, and an unemployed logger would be very unlikely to accept a forest management job.

A recent statewide survey by Bardsley and Haslacher (Harris 1979) showed that residents of the Willamette Valley have desires concerning the use of Federal lands similar to people in Oregon as a whole. The majority of those surveyed favored increased wildlife habitat, hiking and camping, and hunting and fishing, and less use of off-road vehicles and snowmobiles. Survey respondents also showed a preference for more wilderness and for more timber production. These survey results are shown in Table 2-22.

Table 2-22 Changes Desired by Survey Respondents in the Use of Federal Lands (Percent distribution omitting undecided respondents)

	Oregon			Willamette Valley		
Use	More	No Change	Less	More	No Change	Less
Wildlife habitat	61	30	8	62	31	6
Hiking/Camping	52	38	8	53	35	10
Wilderness	44	38	16	44	40	14
ORVs/snowmobiles	13	24	60	13	23	61
Timber production	41	38	19	40	36	20
Hunting/Fishing	51	40	7	52	40	7

Source: Tiff Harris, Public Perceptions of Federal Land Use Decisionmaking in Oregon: Results of a State-wide Survey, Oregon State University, August 1979.

Herbicide use is a controversial issue having many vocal advocates and opponents. Advocates believe it is an inexpensive and safe means of increasing timber production by controlling competing vegetation when used with proper safeguards. Opponents believe further evidence is needed to prove that herbicide use is less expensive than other means. They also believe herbicide use may be damaging to the environment and harmful to human health.

Broadcast burning is one site preparation procedure used to prepare areas (such as this one near Valley of the Giants) for tree planting.

Shelterwood cutting along the Bald Mountain access road allows for the partial retention of scenic quality in this VRM Class III area.

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

CHAPTER 3 ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Throughout this Chapter, environmental consequences (impacts) are compared to the existing situation as described in Chapter 2. The only exceptions are economic impacts which are also based on comparisons with projections of price and revenue levels under the No Action Alternative. The significant impacts resulting from implementation of the proposed action and each of the alternatives are analyzed in relation to that baseline. A tabular comparison summarizing the major impacts from the proposed action and each alternative is shown in Table 1-5. Analysis, including the scoping process, indicates that there would be no significant impacts upon climate, geology, topography, minerals, grazing, agriculture, utilities and communication sites; therefore, these topics are not discussed.

The major actions which cause impacts are timber harvest, road construction, site preparation (includes slash burning and herbicide use), animal damage control, plantation maintenance and release, precommercial thinning and fertilization. Significant effects to the local area and its economic base can also occur depending upon which alternative and harvest volume levels are selected in the decision document. These would include changes in employment and personal income, as well as sharing of sale receipts with county governments.

The Bureau's policy is to maintain a 5-year lead time in timber sale planning which is updated annually. This sample plan (developed for planning purposes) illustrates the first 5 years, providing the proposed action is the selected alternative. The timber sale program for the remaining 5 years is expected to be comparable. This plan contains preliminary estimates of the volume to be harvested, miles of road to be constructed, harvest systems to be employed, acres of slash to be burned, average slope and soil association types to be affected within each sale area. This sample 5-year timber sale plan (available for review at the Salem District Office) is not a firm plan, but one that is flexible and can be modified to eliminate or minimize problems. After potential sales are identified, they are studied in detail, analyzed, modified or dropped as needed to comply with environmental and management goals. Since many of the timber sale areas have not been field checked, the information is subject to change during the preparation of the annual timber sale plans. Site specific environmental assessments (EA) will address impacts and discuss mitigation.

Timber management treatments not included in the timber sale plan (brushfield and hardwood conversion, planting, vegetation control with herbicides, animal damage control, precommercial thinning and fertilization) are analyzed at the proposed 10-year levels. Site specific environmental assessments will be prepared when specific acreages are identified for each treatment. Analysis of the alternatives, including the proposed action, is based on the different levels of treatment shown in Table 1-2.

Because in many cases existing resource data are limited and specific sites for proposed timber management activities are not presently known for the 10-year plan period, both "most probable case" and "worst case" assessments are addressed in this Chapter.

Two time frames are used in the analysis process. The short term is the first 10 years following the adoption of a new timber management plan. The long term is defined as beyond 10 years. Other time periods pertinent to specific impact discussions are used as necessary and are identified in the text.

A basic assumption of the analysis is that sufficient funding and personnel will be available for implemention of the final decision.

IMPACTS ON AIR QUALITY

During the construction of new roads and maintenance of older roads, fine particulate matter would be disturbed. This dust settles back to earth in relatively short distances, does not adversely impact anyone away from the construction sites, and, thus will not be considered further.

The major impact to air quality in the SYUs would be from slash burning, since smoke is a visible intrusion. Normally, smoke would not adversely impact the EIS area, because burn sites are remote and slash burns are scheduled throughout the year; therefore, smoke and pollutants would be dispersed over space and time. Components of wood smoke are given in Table 3-1. Pollutants produced from burning would most likely be mixed by wind and dispersed. Under the Oregon Smoke Management Plan, no burning would be done on days when there was no atmospheric mixing and movement, thus the smoke would dissipate after traveling between 12 to 30 or 35 miles (Fritschen et al. 1970; U.S. EPA 1978). Some villages and residences will be within the 30 to 35 mile radius of slash burns and could be exposed to smoke. The sample 5-year timber sale plan shows eight planned burns (425 acres) within a 35 mile radius of the Portland metropolitan area and six planned burns (493 acres) within that radius of the Salem metropolitan area. These burns are at the extreme range smoke would be expected to travel before dissipating and since burning is authorized only on days of atmospheric mixing, smoke is not expected to adversely affect Portland or Salem.

The wood component of slash is made up of about 50 percent carbon, 6 percent hydrogen, 43 percent oxygen and small amounts of nitrogen and other elements. When burning occurs, temperatures of 570° F to 2550° F are maintained (Hall 1972) which produce carbon dioxide and water vapor. The whitish column of smoke observed from controlled slash fires is made up of over 90 percent water vapor and CO_2 (Table 3-1).

The contaminants most frequently found in slash smoke are carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons (HC) and particulates (Sandberg et al. 1979). CO_2, NO_x and HCs are produced by slash burns in relatively small quantities (see Table 3-1) and probably would not create an adverse impact within the SYUs.

Table 3-1 Components of Smoke From Slash Burning (Tons/Year)

	P.A.	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Alt. 9	Alt. 10
Carbon Monoxide	11,461	15,192	13,509	12,862	10,306	7,585	11,793	11,042	11,061	13,405	10,299
Nitrogen Oxide 1/	176	234	208	198	159	117	181	170	170	206	158
Hydrocarbons 2/	1,102	1,461	1,299	1,237	991	729	1,134	1,062	1,064	1,289	990
Particulates 3/	1,851	2,454	2,182	2,078	1,665	1,225	1,905	1,784	1,787	2,165	1,664
Sulfur Oxides	Negligible										
Water Vapor and Carbon dioxide 4/	Greater than 90% of Combustion Products										

1/ Nitrogen oxides (NOx) are found in some very hot fires, but is probably not a problem. The temperature required to fix atmospheric nitrogen is over 2800° F and these temperatures are not easily attained in slash burns.
2/ Hydrocarbons are a diverse class of compounds containing hydrogen, carbon and oxygen.
3/ Sulfur oxides (SOx) are produced in small quantities, since most forest residues contain less than 0.2 percent sulfur.
4/ Carbon dioxide (CO_2) is not an air pollutant in the usual sense. About 1 ton of burned fuel produces 1 to 1-1/2 tons of CO_2 (Ryan et al. 1976 Cited in Sandberg et al. 1978).

Source: J. Alfred Hall 1972 and Sandberg et al. 1978. Assumes 50 to 60 tons of slash per acre, of which about 75 percent would burn.

Carbon monoxide (CO) is the most abundant pollutant of slash fires (Sandberg et al. 1979), resulting in 20 to 500 pounds per ton of slash burned (Himel et al. 1978). CO quickly oxides to CO_2 and is usually measured in the smoke plume.

Particulates may aggravate respiratory conditions in susceptable individuals, especially in combination with other pollutants. The amount of particulates produced varies from about 67 pounds per ton at a low temperature burn to about 17 pounds per ton in a hot burn.

IMPACTS ON SOILS

The impacts on the soil resource cannot be easily generalized, since slope, geology, climate, soils and vegetation all interact to create a system in equilibrium. Disturbance of equilibrium causes erosion, and erosion occurs in forest lands of WSSYUs as raveling or landslides (mass-wasting). Landslides are the most important erosional process in western Oregon (Brown 1973; Ketcheson 1978).

Compaction results from timber harvest with tractors and when logs are dragged. Percent of areas compacted from harvest techniques are given in Table 3-2. The use of tractors in the past decade resulted in 3,339 acres of soils being compacted. In all alternatives, planned use of tractors is reduced. Compaction would affect between 1,798 acres (Alternative 5) to 3,453 acres (Alternative 1).

Compaction reduces infiltration, and reduces the time required for runoff to reach streams (see Impacts to Water Resources).

Natural variability in soil depth, soil strength, pore pressure, slope gradient and root strength results in soil units having different potential for mass movement. Ketcheson (1978) listed slopes of 80 percent or more, headwalls and channel depression where soil water accumulates, the presence of sandstone outcroppings, and where drainage channels have steep walls (especially those with bedrock channels) as conditions most favoring mass-wasting.

In the SYUs, the areas of rolling and moderate hillslopes with average slopes of 30 to 40 percent have deep soils and exhibit deep rotational slumps and mud flows.

The area of steep, highly dissected topography with average slope gradients of 70 percent and maximum slopes of about 100 percent contains many headwalls, and headwall failure is common. This type of mass-wasting is usually a debris avalanche turning into a debris torrent when mixed with the appropriate amount of water. Ketcheson (1978) reported about 88 percent of all debris avalanches entered stream channels. The ridges between the Trask and Wilson Rivers show pronounced mass movement of the shallow soils on the steeper slopes. Estimate of erosion for each alternative is presented in Table 3-3.

Table 3-2 A Comparison of Compacted and Bared Soil Resulting from Yarding System (Acres/Decade)

Proposed Action and Alternatives	Cable Ground or Partial Suspension (High-lead)		Cable Full Suspension (Skyline)		Tractor Skidding System		Totals	
	Bared 1/ 14.8%	Compacted 1/ 2/ 9.1%	Bared 12.1%	Compacted 3.4%	Bared 35.1%	Compacted 26.4%	Bared	Compacted
Past Decade	3,424	2,104	259	73	4,439	3,339	8,122	5,517
Proposed Action	3,338	2,052	195	55	743	559	4,276	2,666
1 - Max. Tbr.	4,391	2,700	255	72	906	681	5,552	3,453
2 - Str. Tbr.	3,843	2,363	225	63	841	633	4,909	3,059
3 - Emp. Tbr.	3,579	2,200	210	59	810	610	4,599	2,869
4 - Emp. Other	3,094	1,902	181	51	683	514	3,958	2,467
5 - Full Eco.	2,259	1,389	132	37	495	372	2,886	1,798
6 - Lo MHS	3,436	2,113	201	56	750	564	4,387	2,733
7 - Hi MHS	3,156	1,940	186	52	725	545	4,067	2,537
8 - No Herb.	3,280	2,016	192	54	738	555	4,210	2,625
9 - No ACE	2,641	1,624	158	44	671	505	3,470	2,173
10- No Action	3,353	2,062	196	55	745	560	4,294	2,677

1/ Bared soil is expected to be completely denuded of ground vegetation.

2/ Acres of compacted soils. Degree of compaction is not given.

Source: Fredriksen and Harr 1979.

Table 3-3 Erosion on BLM Lands in the SYUs During the Ten-year Management Plan

	Erosion (Tons/Decade) 1/
Past Decade	30,656
Proposed Action	27,721
Alternative 1	51,449
Alternative 2	28,628
Alternative 3	28,098
Alternative 4	25,658
Alternative 5	22,904
Alternative 6	27,816
Alternative 7	27,619
Alternative 8	27,675
Alternative 9	28,241
Alternative 10	27,652

1/ Alternative 1 includes erosion from 1,508 acres of fragile sites. Erosion from possible entry on sites containing fragile soils under other alternatives has not been calculated. Fragile sites would not be affected in Alternative 5.

Note: A prorata distribution of soils as found in the sample 5-year plan was applied to all alternatives. Based on the sample 5-year timber sale plan, about 12 percent of proposed clearcuts and 10 percent of new road construction would be done on lands with steep slopes.

Road building increases erosion 125 times over natural levels (Swanston and Swanson 1976) when slopes are overloaded with excess material and fail, and when runoff is redirected and channeled onto steep side-slopes, creating new drainages. Once constructed, roads result in an irretrievable, long-term loss of the soils resource.

Clearcuts increase erosion three times over natural levels (Ibid) when runoff becomes channeled into skid trails left by high-lead or ground-lead harvesting.

The harvesting of trees from very steep slopes and severe fragile soils would increase erosion, by mass-wasting, 250 times the background levels (Fredrikson 1970). Alternative 1 proposes harvest from 1,508 acres (the 10-year average for the first five decades) of such soils. Optimum protection of fragile soils is afforded in Alternative 5. The proposed action and all other alternatives would allow for entry, if unavoidable, on sites containing severe fragile soils.

Timber management activities would alter soil fertility. Harvest removes nutrients stored in plant tissue, and slash burning removes some nutrients and makes others more available for plant uptake.

IMPACTS ON WATER RESOURCES

Scheduled activities which would impact the water resources include road building, timber harvest, broadcast burning of slash and application of fertilizers and herbicides. The magnitude of each impact would depend also upon the proximity of the activity to the stream.

In the moderate sloped areas where large rotational slumps often stop before entering streams, sediments were measured at 0.10 tons per acre per year. In the steep sloped areas where debris torrents often end in stream channels, sediments were measured at 0.42 tons per acre per year.

Road construction is the major impactor of streams. Road building increases sediments to streams 2 to 4 times above background levels (Brown 1973) except during catastrophic mass-failures when sediments would increase as much as 250 times normal (Fredriksen 1970). Roads on side slopes and poorly maintained roads are most likely to fail catastrophically. Based on the 5-year timber sale plan, most new road construction would be on sites less likely to fail.

Clearcut areas disturbed by yarding increase sediments 1.6 times (Megahan 1972).

For purposes of analyses, the SYUs have been separated into lands with steep slopes and lands with moderate slopes. Based on the sample 5-year timber sale plan, 10 percent of new road construction and 12 percent of clearcuts would be in the steep sloped area.

Changes in stream sedimentation from road building, clearcutting and yarding are shown in Table 3-4.

Table 3-4 Changes in Sedimentation (Tons/Acre/Decade)

	From Roads	From Clear-Cuts & Yarding	Total	Percent Change from Past Decade
Past Decade	935	5,247	6,182	0
Proposed Action	731	4,978	5,709	-8
Alternative 1	756	6,654	7,410	+20
Alternative 2	731	5,752	6,483	+5
Alternative 3	731	5,317	6,048	-2
Alternative 4	604	4,622	5,226	-15
Alternative 5	456	3,381	3,837	-38
Alternative 6	731	5,146	5,877	-5
Alternative 7	731	4,673	5,404	-13
Alternative 8	731	4,879	5,610	-9
Alternative 9	731	3,818	4,549	-26
Alternative 10	731	5,003	5,734	-7

Culvert installation and other instream construction at stream crossings creates a short-term, localized source of sediments. Although momentary concentrations of sediment and turbidity would be high, the energy within the small stream reaches would not be sufficient to transport sediments a great distance. The energy and water volume of larger streams can carry sediments long distances. The sample 5-year timber sale plan shows 15 clearcut units on fragile sites that could increase sedimentation to streams. The 5-year timber sale plan also shows 18 stream crossings on stable soils and 1 stream crossing on a fragile site. This one fragile site crossing and is on a third order stream, and should this crossing be built and fail, sedimentation would be carried a relatively long distance downstream.

Clearcutting and road building increases water yield, because removing forest vegetation reduces evaportranspiration losses and more of the precipitation becomes available for streamflow. The annual increase in water yield from clearcutting is 43 percent (Harr et al. 1979) and is reflected in streams flowing near-full earlier and remaining near-full later in the water year. The time streams flow bank-full or near bank full increases the likelihood of bed and bank erosion. Varying degrees of altered water yields last for about 35 years (Krovner 1956 Cited in Harr et al. 1979). As an example, in Bear Creek (part of the Nestucca River Basin), clearcutting of 232 acres and road building on 12 acres (as shown in the sample 5-year timber sale plan) would alter streamflow by reducing water yield 2 percent below that for present background levels, but still have yields 13 percent above natural levels. Bear Creek is a drainage area of 3,584 acres, about 82 percent BLM-administered lands. Changes in Bear Creek water yields are as follows:

Timber Harvest (past 30 years)

BLM - - - - - - - - - - - - - - 1,724 acres
Private - - - - - - - - - - - - 610 acres

Roads

BLM - - - - - - - - - - - - - - - 134 acres
Private - - - - - - - - - - - - - 22 acres

Harvest identified in the sample 5-year timber sale plan
(BLM) - - - - - - - 232 acres

Estimated Roads (BLM) - - - - - - - - 12 acres
(sample 5-year timber sale plan)

The natural level of water yield in Bear Creek is calculated to be 20,622 acre-feet per year (ac-ft/yr). This would be the average yield from this watershed if there had been no logging activities nor any catastrophic natural events (fire, excessive blowdowns).

The background level of water yield in Bear Creek is measured at 23,715 ac-ft/yr, and represents the current hydrologic condition of the watershed.

Water Yield (annual)		Percent change from natural levels	Percent change from background levels
Natural levels	20,622 ac-ft.		
Background levels (past decade)	23,715 ac-ft.	+15	
With no future harvest	22,684 ac-ft.		-4
With future harvest	23,303 ac-ft.		-2

Unfortunately, sufficient data are not available to calculate water yield changes in each watershed within the EIS area, but similar responses can be expected whenever clearcutting and road building alters the forest hydrologic system. The altered yields are as permanent (or as temporary) as the changes that cause them.

Changes in water yield could reduce or increase water supplies. The sample 5-year timber sale plan shows eight sales, totalling 554 acres, to be clear-cut within 4 of the 18 watersheds used for municipal water supplies (see Table 3-5).

Increased stream flow may result in some streams flowing bank-full, which would result in bank and bed erosion. Due to the many streams in the SYUs with differing water demands, aggregate estimates of water yield changes produce no meaningful conclusions.

Nitrogen, phosphorus and potassium would affect the quality of water following timber harvest and slash burning. Nitrogen losses have been reported (Fredricksen 1971 In Brown 1973) to average 4.6 pounds per acre the first year after clearcutting and slash burning. Broadcast burning of 21,373 acres (proposed action) would cause a loss of approximately 49 tons of nitrogen. It cannot be expected that this total nitrogen would enter streams, as some would be volatilized and lost in smoke. Estimated increases in nitrogen entering streams is shown in Table 3-6. Nitrate, an oxidized form of nitrogen, has been found in western Oregon at 0.4 parts per million (ppm) (a safe level) following slash burning (Brown 1973). Background levels for nitrates average 0.05 ppm (Brown 1973).

Table 3-5 Municipal Watersheds and Planned* Harvests

Water District	Water Supply Source	BLM Acres in Watershed	Percent BLM	Acres Planned Harvest
Scappose	Gourley Creek	600 acres	30%	46
	Lazy Creek	384 acres	38%	None
	South Scappose Creek	1,632 acres	38%	None
Carlton	Panther Creek	1,300 acres	63%	None
Dallas	Rickreall Creek	2,816 acres	23%	None
Falls City	Teal Creek	480 acres	14%	None
Hillsboro, Forest Grove	Tualatin River and	1,198 acres	7%	None
Lake Oswego, Cherry Grove Gaston, Laurelwood	Trask River	571 acres	13%	None
Kernville, Gleneden Beach, Lincoln Beach	Drift Creek	2,048 acres	8%	None
McMinnville	Nestucca River and	920 acres	42%	63
	Haskins Creek	Not Calculated	1%	None
Monmouth	Teal Creek	480 acres	14%	None
Panther Creek	Panther Creek	40 acres	2%	None
Sheridan	East Fork Willamina Creek	50 acres	Not calculated	None
Siletz, Toledo,	Tangeman Creek and	10 acres	3%	None
Seal Rock	Siletz River	17,004 acres	13%	None
Valsetz	Fanno & Handy Creeks	240 acres	26%	None
Willamina	Willamina Creek	16,192 acres	29%	186
Yamhill	Turner Creek	56 acres	10%	None
Alsea	North Fork Alsea River	17,984 acres	49%	259
Corvallis, Philomath	Chintimini Creek	40 acres	1%	None
Walport	West and Eckman Creeks	80 acres	13%	None
Northwood Acres	Unnamed Creek	10 acres	Not calculated	None

* As shown on the sample 5-year timber sale plan

Table 3-6 Possible Nitrogen Entering Streams from Slash Burning

Alternatives	Tons N/Decade Entering Streams	Percent Change from Past Decade
Proposed Action	48	+26
Alternative 1	63	+68
Alternative 2	55	+44
Alternative 3	51	+34
Alternative 4	44	+17
Alternative 5	33	-14
Alternative 6	49	+30
Alternative 7	45	+19
Alternative 8	46	+21
Alternative 9	37	-1
Alternative 10	44	+17

Phosphorus losses following clearcutting and/or slash burning occur when organic phosphorus becomes taken up and held by sediment and is then transported in runoff to streams. Nutrient levels would be expected to increase in any stream flowing through a clearcut following site slash burning.

Nitrogen reaching streams following aerial applications of 150 to 200 pounds of nitrogen per acre has been measured in numerous watersheds and has been found to have not resulted in toxic levels of urea-N, ammonia-N, nitrate-N or nitrite-N in streams draining the treated areas (Miller and Pienaar 1973; Moore 1975). Without site specific locations of proposed nitrogen applications, it cannot be determined what quantity of nitrogen would enter streams. Moore also reported that urea-N was gone from streams in 3 days, and all forms of nitrogen assumed to be from fertilization were gone in 6 months. Therefore, it is expected that fertilization would not have a significant impact on water quality under any alternative.

Design elements (Chapter 1) such as buffer strips are expected to prevent herbicide drift or accidental direct spraying of water bodies. Any herbicide reaching streams beyond these barriers would be insignificant and not adversely affect water quality. Movement of herbicides through the soil (leaching) is relative, and is usually measured in terms of inches or a few feet (Norris 1975). This is a slow process that would not lead to stream contamination because the herbicide would degrade before reaching free water (Ibid). For additional discussion, see Impacts on Animals and Impacts on Human Health.

Although there may be some impact to the Oregon coastal estuaries by activities on BLM-managed lands, such impacts cannot be quantified. It is expected, however, that any impacts would be quite small and short term, since the land area managed by BLM is relatively small within any given watershed; e.g., of the lands within the EIS area draining into Tillamook Bay, BLM manages approximately 3 percent. Quantification of impacts is also restricted because activities on land managed by other agencies and private industry are not known.

IMPACTS ON VEGETATION

This section describes the impacts of implementing a timber management plan on vegetation. All impacts to wetland and aquatic vegetation are expected to be insignificant regardless of the alternative selected.

Terrestrial Vegetation

Management treatments applied under each alternative would impact the existing vegetation in direct relation to the level of treatment shown in Table 1-2. Specific acreages were not identified for some management treatments under Alternative 10, thereby precluding a discussion of the extent of associated impacts. Impacts to riparian habitat are expected to be insignificant under the proposed action and Alternatives 3 through 9 (over 15,000 acres protected). However under Alternatives 1, 2 and 10, riparian habitat would be included in adjacent areas scheduled for final harvest and subsequent management treatments. The resulting impact would be a severe alteration of this important habitat in those areas harvested, which is inconsistent with Executive Order 11990.

Impacting operations associated with road construction include the operation of tracked and wheeled vehicles, blasting, excavating, disposition of overburden and water application. Plant habitat both on and off site is severely altered. On-site soil compaction is usually so great that it would take many years for plants to recolonize, provided there were no traffic or other disturbances. Injury to off-site vegetation could occur from bruises due to machine operation or from herbicide overspray along road shoulders.

Blasting and excavation for roadways often generate spoil materials which are often deposited in areas away from the site, injuring or completely covering off-site vegetation.

Timber harvesting initiates secondary plant succession by overstory removal, creating openings in the forest canopy similar to those created by natural disturbances. Different cutting practices (i.e., clearcutting and single tree selection methods) open the canopy to varying degrees, thereby influencing the plant composition and duration of the plant communities differently.

Clearcutting completely removes the forest canopy, thereby allowing the establishment of the first successional stage (grass/forb). The first entry of a two-stage shelterwood method would essentially produce the same impact as clearcutting. Final overstory removal of shelterwoods would cause some damage to individual plants, however, impacts to the overall plant communities are expected to be insignificant. Openings in the canopy created by commercial thinning, and to a lesser extent mortality salvage, could result in insignificant growth increases of understory vegetation.

Vegetation composition in the SYUs would change according to the level of harvest proposed under each alternative including the proposed action. When compared to the existing forest profile, this change is notable by a shift of

acreage from one age class to another (i.e., old growth to non-stocked or 0-7 year age group). This acreage shift is best shown by a percent change in individual age class stratification as shown in Table 3-7. Long-term effects (1st, 2nd, 5th and 10th decades) were projected and are displayed in Appendices E and F.

Yarding practices to be employed during the proposal period consist of ground or partial suspension cable systems cable with full suspension and tractor systems. Each system impacts ground vegetation to different degrees relative to the soil disturbance resulting from the harvest system used. Table 3-2 shows this effect in acres.

Broadcast burning is the method of slash disposal proposed under each alternative. The short- and long-term effects of burning are relative to the severity of the burn. According to research in the coastal strip of western Oregon (Morris 1970), 0.1 percent of the total area burned was severely burned. While 10.5 percent of the area remained unburned, 14.2 percent and 75.2 percent received moderate and light burns respectively. The lighter burn provides a greater percent of herbaceous and brush cover within the first 2 years after burning. Scheduled replanting of coniferous seedlings in the area would contribute to the alteration as a fire-induced plant community became established. The study also showed that natural restocking of coniferous species was approximately 30 percent greater on burned, as compared to unburned, sites in the first 4 years.

Coniferous seedlings raised in nurseries would be planted (Table 1-2). Under the best possible site conditions, rapid natural regeneration could occur every 3 to 7 years depending on seed crops. Under artificial regeneration, seedlings are generally planted the first year following harvest. Because the planting stock is already 2 or more years old, it can have a competitive advantage on good sites and an even greater advantage on poorer sites. Therefore, planting shortens the amount of time required for succession to progress beyond the grass/forb and shrub/seedling stages. The major long-term impact associated with planting is that, by increasing the competitive advantage of Douglas-fir, early successional stages are more quickly passed through, and Douglas-fir attains site dominance more rapidly. This acceleration not only reduces the residence time of early successional stages but also precludes the development of maximum plant diversity. Planting an estimated 14,300 acres with genetically improved trees during the proposal period would not have a significant effect on the natural gene pool in either the short- or long-term. No significant adverse long-term impacts are anticipated with the eventual planting of genetically improved trees on 90 percent of the area. Maintaining a broad selection of parent trees would ensure variability in genetic base populations.

Herbicides are used to manipulate the species composition, size, density, vigor and presence of vegetation. Applications are targeted to control grass and broadleaf species to provide a competitive advantage for conifers. Different herbicides work best for selected target species and herbicides are

Table 3-7 Approximate Acres of BLM-Administered Timber Lands and Percent of Change After One Decade

Habitat Age	Current Acres	Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt.10 No Action
Grass/Forb Non-stocked and 0-7 years	25,236	18,500 -27%	26,031 +3%	21,960 -13%	20,100 -20%	16,961 -33%	10,774 -57%	19,258 -24%	17,123 -32%	18,054 -28%	13,262 -47%	17,724 -30%
Brush/Seedling 8-15 years	25,590	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	25,236 -1%	23,650 -8%
Pole/Sapling 16-45 years	76,199	76,209 0%	76,209 0%	76,209 0%	76,209 0%	76,209 0%	76,209 0%	76,209 0%	76,209 0%	76,209 0%	76,209 0%	82,060 +8%
Young 2nd Growth 46-115 years	81,683	92,233 +13%	86,945 +6%	90,465 +11%	91,480 +12%	93,218 +14%	96,055 +18%	91,744 +12%	92,964 +14%	92,470 +13%	95,341 +17%	86,385 +6%
Mature 116-195 years	13,260	9,203 -31%	10,756 -19%	11,080 -16%	11,484 -13%	12,286 -8%	11,438 -14%	8,934 -33%	9,849 -26%	9,412 -29%	11,333 -15%	12,450 -6%
Old Growth 196+ years	5,685	5,886 +4%	2,149 -62%	2,317 -59%	2,758 -51%	3,417 -40%	7,077 +24%	5,886 +4%	5,886 +4%	5,886 +4%	5,886 +4%	3,414 -40%

These columns will not have the same total acres due to the differences in the land use allocations of each alternative. This is especially true for Alternative 10 which also utilizes the 1972 land base and inventory.

Source: BLM allowable cut printout and district inventory.

often used in combinations. In forestry applications, the desired effect is acceleration of plant succession from early successional stages to later stages dominated by conifers. Gratkowski and Lauterback (1974) reported on the height growth of young Douglas-fir for a 5-year period after release. Percentage increase in height growth over non-released trees varied from 130 percent (for trees 1 foot high when spraying occurred) to 149 percent (for trees 6 feet high) for basal spray plots and from 255 percent (for trees 1 foot high) to 171 percent (for trees 6 feet high) for aerial spray locations.

Non-target vegetation immediately adjacent to spray units may be affected by the movement of herbicides through the air. Such impacts are limited, but not eliminated entirely, by buffer strips and by application techniques (Gratkowski 1974). Although the direct vegetational impacts of herbicide application are short term, the effects of accelerating the establishment of conifer stands are long term. Once the coniferous stands become dominant they remain until the trees are harvested or until insects, disease or natural disasters remove them. For greater detail on herbicides and the provisions for monitoring of herbicide application, see the FEIS Vegetation Management with Herbicides: Western Oregon - 1978 through 1987 (USDI, BLM 1978).

Some timber stands would be fertilized after proposed precommercial and commercial thinning operations under all alternatives. This practice would result in immediate increases of nutrient availability for all vegetation on the site. However, associated impacts of increased vigor and growth are directed at commercial conifer species. These are short-term impacts lasting for an average of 7 years, depending on site quality.

Threatened or Endangered Plants

Unidentified, threatened or endangered plant species could be susceptible to any impacts described under terrestrial vegetation. Under worst case conditions, the direct effects of injury or death to the plants could cause the immediate elimination of a species in all or a significant portion of its range. The more subtle effects of vegetative community changes could cause the eventual elimination of a species locally through loss of competitive ability relative to other vegetation on the site.

If any species of vascular plant is determined to be threatened or endangered by the U.S. Fish and Wildlife Service, any action that contributes to its extinction or to its threatened or endangered status would be in violation of the Endangered Species Act of 1973 as amended. Therefore, the Environmental Assessment (EA), which would be prepared prior to any site specific action, would identify any threatened or endangered plant species known to be present on the site and appropriate measures to be taken. (See page 1-21.)

Conclusions

Alterations to plant community structure and longevity would be the most significant impacts to terrestrial vegetation on those lands included in the timber production base. Continued timber management would not allow natural succession to replace these communities because future forests would be harvested before they reached the 90-year age class.

Other impacts to terrestrial vegetation are less significant because vegetation which is disturbed or destroyed by timber management activities would eventually be replaced by other plants of the same species and natural succession would restore community structure until the next harvest stage.

The short-term use of the commercial forest lands for timber harvest would increase the long-term production of wood fibers as old, slow-growing stands are replaced by young, fast-growing stands managed for optimum wood production. In the long term, as the area approaches a balance of age classes, maximum growth of commercial coniferious species is achieved. Intensive timber management practices such as planting and herbicide application would favor survival of coniferous trees and discriminate against hardwood trees, shrubs and herbaceous vegetation. However, elimination of hardwood trees, shrubs and herbaceous vegetation would not be achieved nor desired.

Existing older forest communities scheduled for final harvest would be converted to early successional stage communities. This impact is unavoidable. Table 3-7 indicates the amount of old-growth Douglas-fir habitat that would be irretrievably lost as long as deleted acres are managed intensively for timber production for Alternatives 1, 2, 3 and 4. Permanent new road construction ranging from 800 acres in Alternative 5 to 1,400 acres under Alternative 1 would result in the unavoidable elimination of vegetation on these acres.

IMPACTS ON ANIMALS

The impacts on animals or their habitats resulting from timber operations are discussed in this section. In most cases, the greatest and longest term impacts occur on animal habitats, rather than to individual animals. Thomas (1979), Meslow (1977) and Wight (1974) have shown that certain species of vertebrates are associated with forests that are of a particular age class and resulting structure. Some species habitat requirements are rigid, others are more flexible. Appendix D lists species occurring in the SYUs and their association with various habitats.

The predicted structure of habitat on BLM-administered forest lands (Appendix F) was calculated using the allowable cut runs and district inventory data. In an attempt to place BLM plans in perspective, the predicted structure of habitat in the entire North Coast area (as defined in Chapter 2, Animals) was also estimated by applying extremely rough projections of harvest levels (by ownership) on all these lands over the first 10 decades (see Appendix E).

Terrestrial Vertebrates

Transportation System

Road construction would eliminate vegetation from the ground surface. The acreage would vary depending on the alternative selected. The impacts of habitat elimination would be adverse and perpetual since most road systems would be maintained indefinitely. Increased mortality due to collisions with vehicles is unpredictable but probably insignificant.

Harassment of wildlife by vehicles undoubtedly would occur and during stress situations, such as times of temperature extremes, would adversely affect the animal's physiological mechanisms and mortality could occur. Also, new miles of roads mean more access by hunters and increased harvest and harassment is probable. Legal harvest can be limited by regulations adopted by the Oregon Fish and Wildlife Commission but an increase in poaching is possible.

Lyon (1979) and Perry and Overly (1977) have shown that elk use is reduced within one-half mile of roads traversing elk habitat. This reduced use varies with terrain, cover, distance and other factors, so an accurate quantification is possible only on a site specific basis. However, assuming roads traverse elk habitat, some reduction of habitat use would occur and would vary from a high of about 115,000 acres in Alternative 1 to a low of 69,000 acres in Alternative 5. For the proposed action and all other alternatives except 4, about 111,000 acres would be affected. Alternative 4 would affect about 92,000 acres. The reduction in habitat use must be considered significant and adverse. Effects of roads on deer were "variable and relatively insignificant" (Perry and Overly 1977, p. 34).

As a mitigating measure, the proposed action and all alternatives contain recommendations to close some roads in order to reduce harassment and poaching. Past experience has shown these closures difficult to enforce and only partially effective. Assuming funds are available, efforts to close roads and to enforce closures will be continued or initiated in problem areas.

Timber Harvest

The greatest effect timber harvest would have on terrestrial vertebrates during the first decade would be the modification of habitat by clearcutting. The amounts range from 30,047 acres in Alternative 1 to 15,269 acres in Alternative 5. (See Table 1-2). The removal of mature and old-growth stands eliminates the habitat of those species of animals adapted to exist there. If similar unoccupied habitat exists nearby, then those displaced individuals could occupy them. It is unlikely that such a situation exists as it is assumed that habitats are currently at carrying capacity. Therefore, unless those displaced individuals can adapt to the new conditions, they would perish.

Currently there are about 5,700 acres of old growth and an additional 6,100 acres of younger stands with some old-growth characteristics on BLM timber lands in the SYUs (Table 3-8). If the proposed action or Alternatives 5 through 9 were choosen, old growth on BLM-administered land would increase over time, while under Alternative 4 it would decrease slightly then increase. A corresponding increase in animals that find their optimum habitats in these stages would occur. Examples are the big brown bat, northern flying squirrel and pileated woodpecker. Old growth is also a necessary component of elk habitat. It is used during times of extremely severe winter weather as survival cover (Jenkins and Starkey 1980; DeCalesta and Witmer 1980). (See Appendix D for a complete list.) Because mature and old-growth habitats are severely limited, these increases would have a significant beneficial impact. If any of the other alternatives were selected,

Table 3-8 Acres of Old Growth* (196+) on BLM-Administered Lands Remaining at End of Each Decade for Proposed Action and All Alternatives (Current - 11,780 Acres)

Decade	Proposed Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Alt. 9	Alt. 10
1	11,981	8,244	8,412	8,853	9,512	13,172	11,981	11,981	11,981	11,981	3,414
2	11,981	4,205	5,236	6,052	8,998	13,172	11,981	11,981	11,981	11,981	-0-
3	12,261	2,021	2,167	4,436	9,152	13,483	12,261	12,261	12,261	12,261	-0-
4	12,261	924	1,081	2,943	9,075	13,483	12,261	12,261	12,261	12,261	-0-
5	12,324	132	314	3,188	9,530	14,203	12,324	12,324	12,324	12,324	-0-
6	12,517	132	320	3,284	9,665	14,592	12,517	12,517	12,517	12,517	-0-
7	12,670	12	199	3,567	10,242	16,712	12,670	12,670	12,670	12,670	-0-
8	13,467	12	207	4,080	11,133	19,327	13,467	13,467	13,467	13,467	-0-
9	14,603	108	223	4,456	11,842	21,622	14,603	14,603	14,603	14,603	-0-
10	17,670	108	868	6,075	14,468	26,993	17,670	17,670	17,670	17,670	749

Source: BLM allowable cut printout and district inventory

* Amounts of old-growth for each alternative except 10 includes 6,095 acres of younger-aged stands with a few old-growth trees that provide habitat for some species.

old-growth habitat and associated animal communities would decline and by the end of 10 decades, these habitat would have been reduced by 48 percent to 99 percent, depending on the alternative selected. This reduction would be significant and adverse.

When habitat structure on all lands in the North Coast area (see Chapter 2, Animals) is examined (Appendix E) old-growth would decline from 2 percent of the forest to 1 percent or less after one decade in the proposed action and all alternatives. This is because most old growth on private timber lands would have been harvested. At that time, virtually all old-growth timber remaining would be on Federal lands (administered by BLM and U.S. Forest Service). With this reduction of old-growth habitat, a corresponding reduction of old-growth dwelling populations is probable.

Decreases in mature habitat (116-195 years old) would occur in all alternatives. At the end of 10 decades, however, this habitat type would be recovering. The decreases would have an adverse impact until such time as the recovery occurs.

The change that would occur in the pole/sapling and young second growth would be of little significance because of the large acreage occurring in these age classes.

Early successional stages (1-15 years) following harvest would benefit some species. The savannah sparrow, brush rabbit, mountain beaver and mountain quail are examples of species that use early successional stages. The usefullness of this stage to wildlife would be limited as these lands would be planted with coniferous seedlings and, in some cases, other vegetation would be reduced. The resulting forest is not a natural successional stage, but a very simplified one, lacking the structure, diversity and micro-habitats of natural stands. Currently there are about 50,800 acres of non-stocked and early (less than 15 years old) stage vegetation on BLM timber lands of the SYUs. The changes in this habitat that would occur after the first decade are shown in Table 3-8 and Appendix F.

The long-term decreases in grass/forb and brush/seedling stages in Alternatives 5, 7 and 9 would adversely affect species using those habitats. An increase in this habitat would occur if Alternative 1 were selected. This would be beneficial to those species occurring there.

Included in the acres clearcut (Table 1-2) are varying amounts of hardwood (alder). Depending on the alternative selected, 6 to 16 percent of the hardwoods would be harvested during the first decade.

In the Coast Range, the vegetative understory in alder stands is an important source of food for elk and removal of these stands could have an adverse impact (Harper 1980, personal communication). Hardwood stands also provide hiding and summer thermal cover for deer and elk. Harvest of these stands would decrease this habitat until such time as the forests were reestablished. As pointed out in Chapter 2, the white-footed vole feeds on the leaves of alder. Because of the low harvest level, impacts would be localized and insignificant.

In future decades, clearcutting acreage would decrease while commercial thinning dramatically increases (Figure 3-1 is an example based on the proposed action). Commercial thinning would occur in the pole/sapling and young second growth that account for the majority of habitat remaining at the end of 10 decades.

Commercial thinning removes up to 40 percent of the basal area of the forest and has several effects on wildlife habitat. The structure of the forest becomes more simplified and animal species diversity decreases. The stand is opened up and its value as thermal cover is reduced (Edgerton and McConnell 1976). Hiding cover is also reduced and forage may not increase, for as Edgerton (1972) pointed out, deer and elk use was less in partial cut areas (30 percent basal area removed) than in either clearcuts or unlogged stands.

Forest birds would be affected, for as Franzreb and Ohmart (1978) show, thinning decreases habitat value for birds that forage by searching in the tree foliage or gleaning in timber. Species such as red-breasted nuthatch and golden-crowned kinglets would be reduced, while ground feeders such as the robin and house wren would increase.

Cooper's and sharp-shinned hawks use dense second-growth Douglas-fir as their primary nesting habitat (Reynolds 1971). The quality and quantity of this habitat would be reduced by commercial thinning.

The skidding of logs during yarding destroys low vegetation and compacts the soil. The complete but temporary destruction of surface vegetation due to yarding (see Table 3-2) would reduce the amount of habitat for small rodents and insectivores. Shallow soil disturbances that do not remove excessive topsoil may benefit local wildlife populations such as elk and deer, seed-eating birds and certain rodents that depend on early sucessional communities. Swanson (1970 Cited in Bunnell and Eastman 1976) reported significantly higher elk use on moderately or heavily disturbed sites than on lightly disturbed sites.

Snag-dependent wildlife such as woodpeckers and other cavity dwellers would be adversely affected due to snag removal during harvest operations. Based on the work of Thomas (1979), three snags of prescribed sizes per acre would provide for maximum populations of primary excavators. Current BLM policy is to provide snags to manage primary excavators at the 60 percent level. This requires about two snags (of prescribed sizes) per acre be available. Most private lands are not routinely managed for cavity users, therefore the habitat component maintained on BLM-managed lands is crucial to the survival of snag-dependent species.

District surveys revealed that snags are being provided at the rate of 0.2 per acre on recent harvest units despite a current goal of 2 per acre. If this current performance continues under the proposed action or alternatives, primary excavators will fall far short of management goals and viable populations would not be maintained on Bureau-administered lands. This would be an extremely adverse impact. If Alternative 1 were selected, primary excavators would be virtually eliminated from Bureau lands.

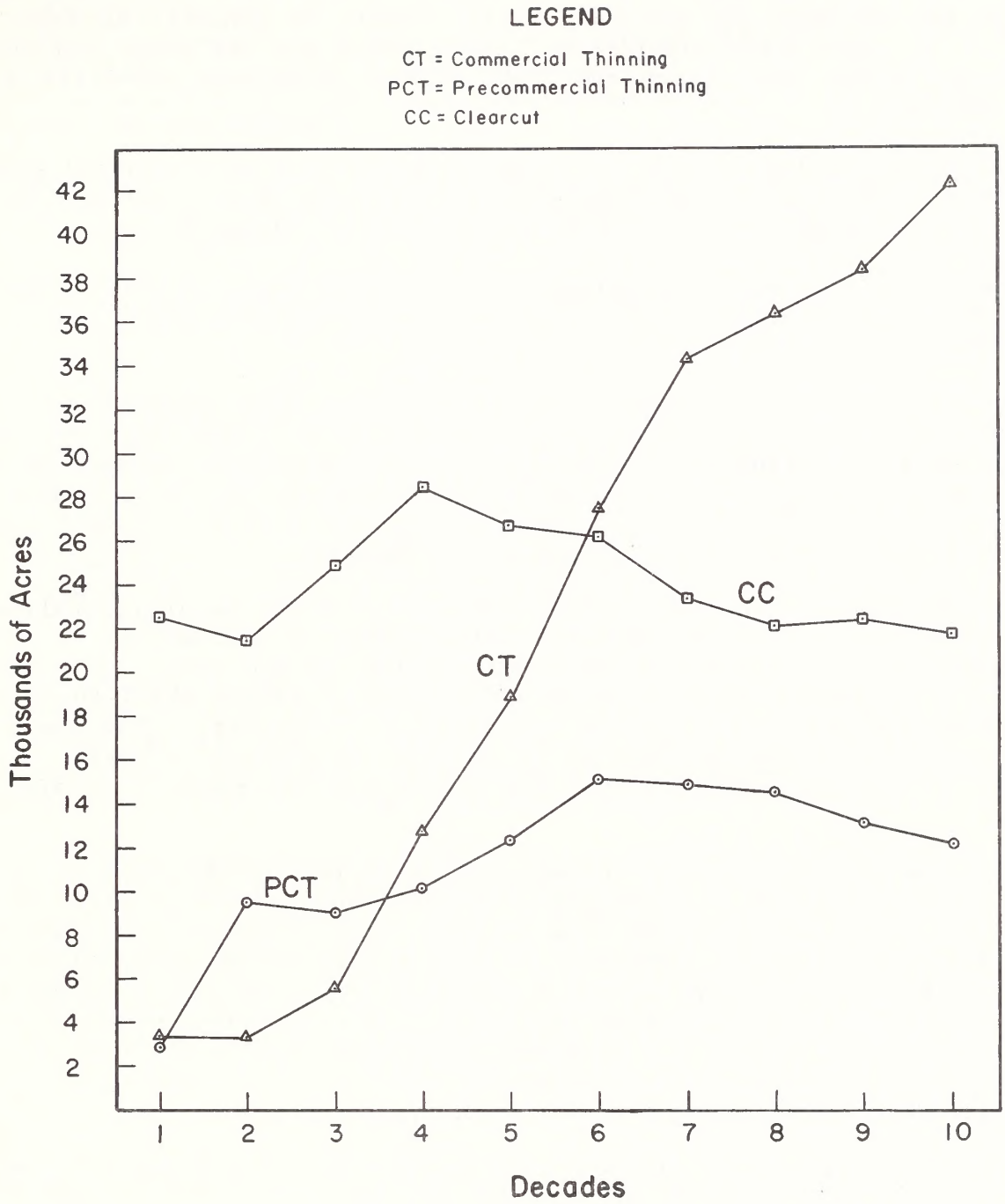


FIGURE 3-1
FOREST TREATMENTS BY ACTION BY DECADE:
PROPOSED ACTION

New snags are created by natural mortality in the forest. The proposed action and all alternatives would receive some amount of mortality salvage during the decade (see Table 1-2). The number of trees per acre, their age and size are variable and not predictable. While in general the impacts would not be immediately significant, these trees are the snags and down forage logs of the near future and removing them eliminates potential and needed habitats.

As a partial mitigating measure, two snags or green trees of prescribed sizes per acre will be left for snag-dependent species in harvest units. This would apply to the proposed action and Alternatives 4 through 9.

Newly harvested areas would be managed for 60 percent populations of primary excavators and unharvested lands would be at 100 percent levels, but all other lands would continue at very low levels.

District biologists have calculated that it would take four snags per acre on newly harvested areas to make up current deficiencies. Therefore the two snags per acre mitigating measure would mean that numbers will decrease below the present 10 percent mark, far short of the 60 percent population goal for primary excavators. This is an extremely adverse and significant impact over at least the short term and probably up to six decades.

Long-term benefits of this mitigation measure would not be fully realized until the forest reaches regulation. Perpetuation of the measure to that point would provide a minimum of two snags per acre on all lands. Snag size on the younger stands would probably not exceed 17 inches which would be large enough for all species except the pileated woodpecker. This species would be severely impacted regardless of the alternative selected. If Alternatives 1, 2, or 3 were choosen all cavity dwellers would be adversely impacted.

Food supplies for grazers and browsers are more readily available in the early successional stages as compared with other successional stages. Deer and elk use would increase and peak 6 to 8 years following clearcutting (Harper 1969; Crouch 1974). However, the food supply may not be utilized if sufficient hiding or escape cover is not nearby. In order to assure sufficient wildlife cover, Bureau policy is that clearcuts normally not exceed 40 acres. Also the proposed management framework plan (MFP) recommends that, when possible, undisturbed buffer strips should be left around clearcuts for at least 10 years.

In the sample 5-year timber sale plan, 41 of the 376 sale units would exceed 40 acres in size and 91 would not meet the 10-year buffer strip criterion. The sample plan is probably representative of how often the objectives can be met.

Other Timber Management Treatments

Other treatments (Table 1-2) alter animal habitat through vegetative manipulation.

Slash burning would eliminate most live vegetation from the site and 80 to 90 percent of the combustible material less than 3 inches in diameter would be consumed. Larger material is generally charred in place. Table 1-2 lists acres to be burned for the proposed action and all alternatives. These effects vary with the intensity of the burn, but immediate impacts would be removal of vegetation and associated animal populations. This would last less than one growing season, after which a vigorous growth of grasses and forbs would appear and animal populations adapted to early stage vegetation would be reestablished.

The removal of woody material reduces obstructions to deer and elk (Crouch 1974). Other species such as juncos and wrens use logging slash as activity centers. Juncos declined when slash was burned. (Franzreb and Ohmart 1978). Charring of the larger material removes bark and eliminates micro-habitats for invertebrates that are an important item in the food chain. In addition, the resulting habitats lack structure that slash provided and are more simplified.

Harper (1969) reported higher Roosevelt elk use on logging sites that had been burned than on those that had not been burned, and explains that on burned sites grasses were more than three times as abundant. Grasses are a preferred food item of elk. He warned, however, that slash burning would not necessarily increase forage and subsequent elk use on all sites as physical characteristics make each site different in its response to burning. Also, Crouch (1974) indicated that slash burning increased the food supply for black-tailed deer.

Mechanical piling of slash would cause soil disturbance and have impacts similar to that caused by yarding. Piling removes downed slash that may cause barriers to large ungulates but can result in large barriers if windrowed. Subsequent burning removes these barriers and enough debris may be left to provide habitat for some birds and small mammals.

There are approximately 1,300 acres of non-merchantable hardwoods (mostly alder) and brush fields in the SYUs. In the proposed action and all alternatives, about 1,000 acres would be removed in an attempt to convert hardwood stands to conifer stands (Table 1-2). These acres would be clearcuts, but would be unregulated by the proposed MFP recommendations on time and size restraints. These stands add to habitat diversity and their elimination would be adverse. However, due to the small acreage involved, this action is considered of minor importance.

During the decade, an estimated 600 acres would be subjected to trapping in an attempt to control numbers of mountain beaver. Past records indicate about seven per acre are removed. Nontarget species such as long-tailed weasels, skunks and squirrels made up about 6 percent of the catch. Most of the incidental catch occurred during the first 6 weeks and after adjustment of the trigger mechanism the incidental catch dropped. The small numbers of nontarget animals involved would have a local impact but be of little significance over all.

The proposed action and all alternatives except Alternative 8 call for herbicide use in site preparation and conifer release during the decade. The impacts from the proposed action and all alternatives except Alternative 8 are the same, only the magnitude changes. (See Table 1-2 for acres treated.)

There are four major types of impacts to animals that could be associated with silvicultural herbicide application: exposure to toxic chemical levels, exposure to chronic levels, habitat modification and carrier impacts. The following is a brief discussion of these four impacts. For much greater detail, refer to the final EIS on herbicides (USDI, BLM 1978) and final EIS South Coast Curry (USDI, BLM 1980).

Exposure to acute toxicity levels of herbicides is not anticipated as none of those proposed for use have been reported to be highly toxic to wildlife when used as manufacturer's label prescribes.

Chronic (long-term) effects of herbicides on animals are generally unknown in those herbicides proposed for use. It seems unlikely that an individual animal would be exposed to repeated treatments. Therefore, the potential danger to wildlife from acute or chronic poisoning is unlikely at the proposed use rate.

Herbicides have pronounced impacts on wildlife habitat. These impacts are brought about by losses of habitat diversity and stratification resulting from the temporary elimination of certain plants that are in competition with the desired coniferous species. This would adversely impact those animals that utilize the grass/forb and shrub/seeding successional stages.

Diesel oil is often used as a carrier for forest herbicides. Data on the toxicity of diesel oil on wildlife are limited; however, some work has been done on the adverse effects on adult ducks (Tucker and Crabtree 1970; Hartung 1966; Hartung 1965). It is unlikely that wild animals would consume lethal amounts of the carrier because of the dilution factors involved. It may, however, adversely affect the palatability of the forage.

Precommercial thinning, although it may open a young forest canopy, generally does not benefit deer and elk because the unremoved slash impeeded movements. The obstacle presented by slash accumulations restricts deer and elk from utilizing any forage increases which result from the thinnings. Cover use is also restricted by slash accumulations. Therefore, greatly reduced deer and elk use would occur on those acres precommercially thinned. (See Table 1-2.) This condition could last as long as two decades before decomposition removed the obstacles. The amount of acreage receiving precommercial thinning changes over time (see Figure 3-1 for an example).

Conversely, birds and small mammals may increase their use of an area following precommercial thinning. Slash accumulations provide cover for them and any increases in forage production can be utilized.

Fertilization increases the growth and palatability of many plant species. These increases may be utilized by wildlife which would be a short-term positive impact.

Fish

Impacts of timber management on fish and aquatic habitat fall into the broad categories of increased accumulation of bottom sediments, increased amounts of suspended sediments, altered amounts of stream flow, introduction of logging debris, change of water temperature, destabilization of banks and channels and reduction of instream structure.

The impacts from the 10 alternatives differ primarily in magnitude from the proposed action. These differences reflect the acres of land treated and miles of road built. For instance, Alternative 5 has fewer miles, while Alternative 1 has more miles of road than the proposed action. Alternative 8 uses no herbicides so related impacts would not occur. (See Table 1-2 for all treatments.)

On lands administered by BLM in the SYUs, there are approximately 320 miles of streams that support cold water fish (see Table 2-8). Analysis of the sample 5-year timber sale plan shows that approximately 16.5 miles of stream pass through or are adjacent to 90 harvest units.

The habitat of aquatic invertebrates, which are important both as food for fish and as indicators of stream quality, can also be modified or destroyed by the same factors that affect fish habitat. It is assumed that impacts to most invertebrates would be similar to those experienced by fish in localized areas.

Maintenance of undisturbed buffers will help minimize stream degradation. Alternatives 1, 2 and 10 have no provisions for unharvested buffer strips and stream productivity would deteriorate greatly. Research by Erman et al. (1977) revealed that when buffer strips of at least 30 meters (about 98 feet) width on each side were maintained, the macro-invertebrate populations were indistinguishable from those of unlogged streams.

Chapter 3, Inpacts on Water Resources, provides data on expected amounts of sediments and water that would reach the streams of the WSSYUs and compares them to existing amounts. Many of the analyses and conclusions appearing in this section are based on those data.

Transportation System

The construction of roads can add greatly to the sediment load of a river. Maintenance problems with existing roads would continue to contribute to this problem. However, impacts from maintenance cannot be quantified. Road building during the decade would be less than in the past decade; accordingly, sedimentation from road building would be reduced. (See Table 3-4.) Analysis of the sample 5-year timber sale plan shows about 4 miles of road in 15 harvest units would be built on fragile or unstable soils that are adjacent to streams with fishery values. If sedimentation increased, the impacts would be adversely significant to localized areas. Downstream sedimentation could occur and could have significant downstream effects.

Nineteen new roads identified in the sample 5-year timber sale plan would cross streams with fishery values. Eighteen are on stable soils so only short-term localized impacts are expected. However, one is on a fragile soil site. Should this crossing be built and fail because of soil type there would be long-term adverse impacts.

In discussing impacts to the aquatic invertebrates, Erman et al. (1977) suggest that repeated failure of road crossings was the cause of disruption of the stream biota, not the construction of road crossings. Investigations in the vicinity of newly installed culverts showed only a slight impact.

Timber Harvest

Timber harvest can have an adverse impact on fish habitat by removing the riparian zone, changing water yield and increasing sedimentation.

Removing the riparian zone, including old-growth conifers, would increase the amount of fine organic material, reduce the number and quality of pools, reduce useable spawning gravels, reduce macro-invertebrate production areas, destabilize banks and channels, and increase water velocities. Logging riparian zones would also increase siltation of stream bottoms and change temperature regimes by decreasing and increasing shade. Where some streamside vegetation is retained, no change in temperature was observed (Brown and Krygier 1970). If buffer strips are maintained as proposed, no impacts on water temperatures are expected. In Alternatives 1, 2 and 10, no unharvested buffers would be left and temperatures would increase.

Clearcutting increases water yield (see Impacts on Water Resources), which could have a scouring effect on stream bottoms, thereby removing gravel and aquatic vegetation. Based on the analysis described in the Bear Creek example, it is estimated that water yields would decrease from current levels, but remain above undisturbed levels. Water yield changes would have a negligible impact to the SYUs as a whole. Where unharvested buffer strips are maintained it is unlikely that significant amounts of debris would enter the rivers.

Harvest and yarding could contribute considerable sediment to local streams. Increases in bottom sediments, according to Gibbons and Salo (1973), cause the most damage of all factors affecting aquatic life. The amount of sedimentation would depend on the alternative selected: most would result in decreases compared to past activities but two would increase sedimentation (see Table 3-4).

The increase is small in Alternative 2 but there could be adverse impacts in local situations. In Alternative 1 the increase is greater and adverse impacts would be expected if this alternative were selected. In the sample 5-year timber sale plan, there are 15 harvest units on unstable soils that are adjacent to streams with cold water fish values. Should project design features fail, portions of these streams could be adversely impacted.

Other Timber Management Treatments

Burning, animal damage control, precommercial thinning and fertilization are not expected to have a significant impact on fish.

The chemicals proposed for use for vegetation control and the levels of their application are not expected to measurably affect aquatic vegetation. Streamside vegetation that provides shade could be altered in a worst case circumstance. Buffer strips along streams should prevent this from occurring. However, due to pilot error, some parts of these buffer strip may receive application, and some detectable amounts may reach the stream.

Toxic effects of herbicides on fish have been documented in the laboratory U.S. EPA (1977). However, proposed field application rates would be considerably less than the minimum lethal dose for those species tested and toxic effects are not expected. (See final EIS on herbicides, USDI, BLM 1978, for more detailed information.) It should be noted that long-term effects, particularly under field conditions, are more difficult to determine than are effects in short-term laboratory tests. Also, Cameron and Anderson (1977) felt that more study was needed in order to evaluate the impacts to aquatic plants and animals under field conditions. However, Cameron and Anderson's monitoring program in 1977 and Anderson's monitoring in 1979 showed that amounts of herbicides in streams did not exceed EPA'S "safe" level standards.

Hardwood stand and brush conversion would have the same impacts that clear-cutting and associated yarding would have. Much less acreage is involved and the impacts would be considerably less than for clearcutting. Some local adverse impacts would occur if the conversion takes place near streams.

Threatened and Endangered Animals

Threatened and endangered species receive special attention under the terms of the Endangered Species Act of 1973 as amended and BLM policies and guidelines. Known locations of these species are avoided and special precautions taken to assure their well-being. (Chapter 1, Forest Management Treatments and Design Elements) Because of their habitat requirements and locations, no impacts are expected to occur to the western spotted frog, California brown pelican, Aleutian Canada goose, peregrine falcon or western snowy plover.

Transportation System

Threatened or endangered species would probably be affected only to the extent that road construction could open previously unaccessible areas. This impact cannot be quantified or qualified.

Timber Harvest

Habitat modifications caused by clearcutting would have major impacts on old-growth-dwelling species. The northern spotted owl, a State-listed species, is dependent on old-growth closed-canopy forests and would be greatly affected.

The Oregon Endangered Species Task Force management recommendations for each pair of owls (in effect during the preparation of the proposed MFP), called for total protection of 300 acres of old-growth core area (if available) and an additional 900 acres to be managed to provide at least 50 percent of the acreage in stands of 30+ year-old forests. Assuming that these recommendations identify minimum essential habitat, the proposed action and Alternatives 6 through 9 would protect 21 pairs, Alternative 5 would protect all known owls, Alternative 2 would protect 1 pair, Alternative 3, 11 pairs and Alternative 4, 19 pairs. Alternatives 1 and 10 have no provisions to protect any owls.

A proposed revision of Task Force recommendations has resulted from recent data. The revision recommends that forests be managed to provide 1,000 acres of old growth per pair of owls within 1.5 mile radius of nest sites.

Implementation of the new recommendations in the WSSYUs would be limited by the extent of the existing old-growth forest. The following analysis of the relationship of the alternatives to spotted owl habitat is based on the assumption that the revised recommendations identify minimum essential habitat. Land use allocations in the proposed action and Alternatives 3 through 9 would provide enough habitat so that one owl pair would survive and three other pairs might exist under marginal conditions. Initially, Alternative 5 would provide for one to four pairs, although after 10 decades, habitat for 10 pairs would exist. Alternatives 1, 2 and 10 would not provide habitat for any owls.

The existing bald eagles are not expected to be impacted since U.S. Fish and Wildlife Service Bald Eagle Management Guidelines (1977) are followed to avoid adverse impacts. However, failure to provide suitable habitat for possible expansion in Alternatives 1, 2 and 10 would have an adverse impacts on this species if one of those alternatives were selected.

Harvest and mortality salvage in riparian areas are restricted in the proposed action and Alternatives 3, 4, 5, 6, 7 and 9; they are not restricted in the other alternatives. Salvaging dead and dying trees would remove potential nest sites and limit possible expansions of the bald eagle population. The failure to provide habitat for eagle population expansion in Alternatives 1, 2 and 10 would have an adverse impact.

Conclusions

In the proposed action and Alternatives 3 through 9, the long-term changes that would occur to wildlife habitat would be beneficial. These alternatives would increase habitat diversity and mature and old-growth habitat over existing levels except for a decrease of old growth in Alternative 3. If Alternatives 1, 2 or 10 were selected, there would be a great decrease in mature and old-growth habitats and those species using those habitats would also decline. This decline would be adverse and significant.

Simplification of forest habitats would also have a great effect on wildlife. Pole sapling and young second growth (which would account for most of the forests) have low environmental variables (simple structure) even under natural conditions. Further loss of structure from thinning would make these age classes of very low value for most wildlife. Further simplification resulting from hardwood conversion, broadcast burning and herbicides would add to the loss of diversity. This simplification and loss of diversity would be significant and adverse.

Primary excavators would remain at low levels as mitigation measures would not be sufficient to increase their number for several decades.

Habitat removed by road construction would be permanently and irretrievably lost on those roads proposed as part of the permanent road system. The construction of new roads would lead to harassment of wildlife and reduce useable elk and large carnivore habitat within one-half mile of these roads.

Deer numbers are not expected to be greatly modified by any of the alternatives. However, because of different requirements, elk numbers would be greatly influenced by many of the alternatives. The changes would be due to changing habitat conditions, new road construction, thinning and other habitat modifiers. Table 3-9 shows estimated changes in elk populations by alternative from present size.

Table 3-9 Estimated Elk Population Changes on BLM Lands 1/

Alternative	5th Decade	10th Decade
Proposed Action	- 5%	+35%
1 - Max. Tbr.	*	*
2 - Str. Tbr.	*	*
3 - Emp. Tbr.	-30%	At Current Levels
4 - Emp. Other	-10%	+50%
5 - Full Eco.	+40%	+110%
6 - Lo MHS	- 5%	+35%
7 - Hi MHS	- 5%	+35%
8 - No Herb.	- 5%	+35%
9 - No ACE	- 5%	+35%
10 - No Action	*	*

1/ All values ± 10 percent

* In these alternatives, elk populations are expected to be less than 500 animals.

Source: BLM District and State Office personnel

Short- and long-term impacts may differ by alternatives; however, Alternatives 1, 2 and 10 would have significant adverse impacts on the elk populations in both the short and long term.

Based on predicted habitat conditions on BLM-administered lands, native salmonids would occur as shown in Table 3-10.

Table 3-10 Abundance of Salmonids as a Percent of Optimum 1/

	Alternatives										
	PA	1	2	3	4	5	6	7	8	9	10
2nd Decade	65	15	20	65	65	75	65	65	65	65	15
10th Decade	80	15	20	80	80	90	80	80	80	80	15

1/ Current populations are estimated at 50 percent of optimum. All values ± 10 percent.
Source: BLM District personnel

In both the short and long term, Alternatives 1, 2 and 10 would have an adverse impact on salmonids. The other alternatives would be beneficial, particularly in the long term.

The northern spotted owl is the only species listed by the State of Oregon as threatened that would be adversely impacted. The original recommendations of the Oregon Endangered Species Task Force influenced the proposed plan for the EIS area. Assuming that these recommendations identify minimum essential habitat, 21 of the 26 known owl pairs in the SYUs would be fully protected under five of the alternatives, including the proposed action. Three of the alternatives would provide this level of protection for only one or none of the pairs; all others may be lost if one of these alternatives is selected. A recent proposed revision of the Task Force recommendations indicates that minimum habitat requirements may be greater. If so, most alternatives would maintain no more than four pairs. Alternative 5 would originally maintain only those numbers also, due to the limitations of existing habitat, but eventually would provide habitat for 10 pairs.

The cumulative effects on the northern spotted owl are difficult to predict as planning efforts by land managing agencies are just beginning. At present, only the Medford District of BLM is committed to plans of action. Following original Task Force recommendations, their plans target 14 pairs of northern spotted owls for habitat protection. Should the Salem District accept the minimum seven pairs proposed and other BLM Districts and land managing agencies not provide for the recommended numbers, then the species would certainly be in danger and be considered for Federal status.

Conversely, if other agencies and BLM Districts except Salem follow Task Force recommendations, the loss of Salem's seven pairs, while leaving a gap in the population distribution, would probably not jeopardize the population as a whole.

IMPACTS ON RECREATION

The proposed action and each alternative vary in approach and emphasis on meeting recreational needs. Localized recreational visitation in certain activities may decrease if needs are not met for areas and facilities. The provision of areas and facilities for recreational pursuits would be beneficial since opportunities would be available to meet increasing demand (Chapter 2, Table 2-11).

Alternative 1 would protect existing recreation sites to the extent that coniferous lands (66 acres) at these sites would not be subject to harvest. Alternatives 2 and 10 protect all existing recreation sites with buffers (105 acres). Beneficial impacts could occur under the proposed action and Alternatives 3 through 9 as provision would be made for development of additional recreational sites.

Alternatives 1, 2 and 10 have no provision for the designation of recreation lands to protect and manage large areas with exceptional recreation values, and Alternative 3 provides only modest provision (1,800 acres) for recreation land designation. Beneficial impacts would occur as quality recreation experiences would be provided and maintained in 10,600 acres of recreation lands under the proposed action and Alternatives 4, 6, 7, 8 and 9. Alternative 5 calls for the designation of 14,280 acres of recreation lands with quality values.

Alternatives 1, 2 and 10 have no provisions for specific areas managed for sightseeing, cross country skiing, snowshoeing, hiking, backpacking, horseback riding and fishing. Beneficial impacts would occur under the proposed action and Alternatives 3, 4 and 6 through 9 since provision would be made for such areas and for the management of them for those recreational uses. Alternative 5 provides additional areas for sightseeing and fishing.

The quality of opportunities for most recreational activities would be impacted as changes in the setting occur. Most timber management activities alter recreation opportunity settings (see Glossary). From those settings, recreationists participating in different activities derive different satisfactions, experiences and benefits. As changes in the recreational setting affect experience opportunities (see Glossary), visitor use changes occur. Visitor use changes may be temporary, such as declines occurring only during actual harvest, or of many years duration if the required recreational setting and desired experience opportunities have been significantly altered. In some cases, visitors may relocate to other areas where opportunities for the desired experiences exist.

As natural or natural-appearing environments are altered, experience opportunities related to appreciation of the natural environment are reduced. Opportunities for such activities as camping, hiking, fishing, hunting, nature study and specific sightseeing would be degraded in some localized areas. The degree and magnitude of impact would be dependent upon the level of intensive timber management under each alternative.

Clearcutting enhances certain recreational activities such as collecting, berry picking, general sightseeing, picnicking and using ORVs. The impacts of clearcutting would be most significant under Alternative 1 and moderately significant under Alternatives 2, 3 and 9. The proposed action and Alternatives 6, 7, 8 and 10 call for levels of clearcutting similar to that under the existing situation. Under Alternatives 4 and 5, clearcutting would be significantly less than under the existing situation.

Area-wide impacts to fishing and hunting are dependent upon impacts to the species (see Impacts on Animals). Area-wide fishing use would be significantly impacted under Alternatives 1, 2 and 10 due to decreasing fish populations. Elk numbers would decline greatly under Alternatives 1, 2 and 10. Under the proposed action and Alternatives 3 through 9, elk populations would decline for several decades but would then show increases (over the existing situation) after five decades (see Table 3-9). Insofar as forest habitat simplification would affect elk populations, area-wide hunting and wildlife sightseeing use would be impacted. It is likely that declining elk populations would lead to further regulation on hunting.

Accessibility for dispersed recreation (especially ORVs) would be improved as a result of new road construction. On specific stream reaches, some adverse impacts may occur to fishing success as sedimentation and water quality changes occur (see Impacts on Water Quality). The beneficial and adverse impacts of road construction would be most apparent under the proposed action and Alternatives 1, 2, 3 and 6 through 10 (173 miles of new road) and least apparent under Alternative 5 (108 miles). Alternative 4 calls for new construction of 143 miles of road.

Many timber management activities create noise, odors, dust, fumes and additional traffic. Some experience opportunities would be degraded by these factors. However, many road-oriented dispersed recreationists indicate that impacts of timber management do not detract from their enjoyment (Downing and Clark 1979).

Table 3-11 identifies sales in the sample 5-year timber sale plan which could impact specific recreation activities and sites. The analysis indicates that slight reductions in localized visitor use would occur in those areas. Environmental assessments which precede each timber management action will present a site-specific analysis of these impacts.

In the sample 5-year timber sale plan there are 17 units within one-quarter mile of the Nestucca River. Preliminary analysis indicates that while these sales would not significantly affect the water quality or free-flowing nature of the river, they may have the potential to significantly alter the river's setting by introducing significant visible, audible or sensory intrusions. With mitigation where necessary, the effects of timber management within the Nestucca River corridor would be minimized and are not expected to significantly impact those values of the Nestucca River which could qualify it for National status. Impacts will be further analyzed in the environmental assessments which precede each timber sale. If it is determined during site

Table 3-11 Potential Impacts of the Sample Five-Year Timber Sale Plan on Recreation Resources 1/

RECREATION SITE SETTING INTEGRITY		Number of Units with Potential Impacts	Potential Impacts to Localized Visitor Use
Dovre Recreation Site (BLM)		2	Slightly adverse
RECREATION ACTIVITIES	QUALITY RATING 2/		
Fishing 3/			Slightly adverse
Testament Creek	(B,C)	1	
Beaver Creek	(B)	2	
Little Lobster Creek	(A,B,C)	1	
Rock Creek	(C)	1	
Fall Creek	(C)	1	
Klickitat Creek	(C)	3	
Raymond Creek	(B)	1	
McKay Creek	(B)	1	
Denny Creek	(B,C)	1	
Agency Creek	(B)	1	
Yoncalla Creek	(C)	1	
Wind River	(C)	1	
Coast Creek	(C)	3	
Willamina Creek	(B,C)	4	
Hunting 4/			
Sightseeing (botanic)			Slightly adverse
Lobster Creek Old-growth	(B)	4	
Skunk Creek Old-growth	(C)	1	
Little Crass Mtn. Crass Bald	(B)	1	
Upper Parker Creek Alder Stand	(B)	1	
Sightseeing (zoologic)			Slightly adverse
Nestucca River/Boundary Road Elk Herd	(B)	39	
Clear Creek Elk Herd	(C)	10	
North Fork Siletz River Salmon Migration	(B)	1	
Lost Prairie Elk Herd	(A)	2	
Sightseeing (historic)			Slightly adverse
Crindstone Mountain Lookout	(B)	1	
Sightseeing (other)			Slightly adverse
Klickitat Road Viewpoint	(B)	1	
General Leisure			Slightly adverse
Corvallis to-the-Sea Trail (proposed)		4	
Recreation Lands (proposed)			Slightly adverse
Nestucca River 5/		26	
Alsea-North Fork		11	
Alsea-South Fork		4	

1/ Sales would be within one-quarter mile of developed sites and adjacent to or within recreation activity areas.
2/ Quality ratings are as follows: A-high, B-moderate and C-low and are based upon evaluation of recreation opportunities in accordance with methodology shown in BLM Manual 6111.
3/ Impacts to localized fishing opportunities focuses on those specific stream reaches to be managed for improving the quality or increasing the use of those recreation resources. The section on Impacts to Animals, Fish, presents further insight on area-wide impacts to sport fishing.
4/ See section on Impacts to Animals since impacts to hunting would be dependent on impacts to the species.
5/ Designation of this area as an Area of Critical Environmental Concern (see Glossary) under the proposed action and all alternatives except 1, 2 and 10, would serve to mitigate potential adverse impacts to the recreational, scenic and fishery values of the area.

specific analysis that timber management actions could adversely affect National status for the Nestucca River, BLM would consult with the National Park Service to develop appropriate mitigation measures. Alternatives 1, 2, 3 and 10 have the greatest potential for adversely impacting those significant values of the rivers identified.

Under the proposed action and Alternatives 4 through 9, no significant impacts would occur to those portions of the Alsea, Nehalem, Siletz, Trask and Willamette Rivers listed in Phase 1 of the Nationwide Rivers Inventory.

Conclusions

Impacts of timber management operations are both beneficial and adverse, depending on the individual's desired recreational experience. An irretrievable loss of solitude, serenity and/or isolation would occur in some areas. Beneficially, some dispersed area recreationists would find additional areas available for their pursuits, and some areas would be more accessible due to timber management activities.

Timber management activities affect a recreational area's remoteness, size and evidence of human activities. In the long-term, much of the managed forest would portray moderate evidence of human activity usually in harmony with the environment. Opportunities would be available for isolation, as well as for interaction with other forest users. Visitation by recreationists who seek a natural environment may diminish in some localized areas, and a resultant relocation to other areas with natural characteristics would occur. Timber management activities would result in a slight increase in dispersed activity visitor use.

Visitor use increases or reductions may occur in certain areas as a result of impacts to specific recreational experiences. While Alternatives 1, 2 and 10 would serve to most adequately meet increasing demand for motorized recreational vehicle use and dispersed use areas, visitation associated with other activities may decrease since needs for areas and facilities would not be met. The proposed action and Alternatives 3 through 9 would serve to meet most recreational needs.

Table 3-12 shows estimated recreational visitation to 1990 under the proposed action and alternatives. Hunting estimates are primarily a result of impacts expected to elk populations. Fishing estimates assume that a 25 percent increase in fish populations would be necessary to meet projected demand. Estimates for general recreation use are based on magnitude of recreational experience degradation and the extent to which each alternative provides areas and facilities for recreation.

IMPACTS ON CULTURAL RESOURCES

Complete field surveys of the WSSYUs to identify cultural sites have not been undertaken. However, a complete field survey of cultural resources will precede each specific timber management action that would result in ground disturbance or the transfer of title (BLM Manual 8100, Cultural Resource Management). It is still possible that some sites would remain undiscovered.

Table 3-12 Estimated Recreational Visitation (1990)
Visitor Days/Year

Recreational Activity	1975 Visitation 1/	1990 Demand Projection 1/	Proposed Action, Alts. 6-9	Alts. 1, 2, 10	Alt. 3	Alt. 4	Alt. 5
Hunting	34,000	41,000	38,200	37,000	37,400	37,000	39,800
Fishing	86,000	135,000	113,000	41,000	113,000	113,000	135,000
General Recreation 2/	311,000	402,000	382,000	342,000	362,000	382,000	394,000
Total	431,000	578,000	533,200	420,000	512,400	532,000	568,800

1/ See Table 2-11

2/ Includes all activities shown in Table 2-11 except hunting and fishing

Source: Derived from Bureau planning documents, visitor use projections and professional estimates.

Under the proposed action and all alternatives, protection would be provided in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR Part 800). Under the proposed action and all alternatives except 1 and 2, the 37 known historic sites on public land would be fully protected. Under Alternatives 1 and 2, sites determined eligible for the National Register would be protected in place, while appropriate measures for data recovery would be developed for all other cultural sites prior to ground disturbance.

It is possible that undiscovered cultural resources could be inadvertently impacted under the proposed action and all alternatives. The potential for damage would depend on timber harvest levels under each alternative and upon the success of pre-disturbance field surveys. Undiscovered cultural resources could be impacted by soil compaction, ground disturbance and alteration of the soil's chemical properties by fire, chemical treatment or addition of organic matter (Wildesen 1977). Soil compaction and ground disturbance could disrupt vertical and horizontal relationships of cultural deposits. Artifact loss or breakage could also occur. The possibility of illegal artifact collecting increases when sites are uncovered. Chemical alteration of sites, materials and soil could occur during slash disposal and site preparation. Fire destroys combustible items and may damage stone and ceramic artifacts by causing color and textural changes. Heat may fracture artifacts. Charcoal could contaminate Carbon 14 dating samples making them unreliable for scientific analysis.

It is not possible to estimate the number of undiscovered sites that could be impacted. In the worst case, structural remains and subtle indications of prehistoric activity would be completely obliterated. Prehistoric sites with subsurface deposits would be severely impacted within the top 20 inches of the deposit.

Road construction under the proposed action and alternatives would provide additional access to known cultural sites, resulting in increased visitation. Vandalism, theft and site erosion could result. Esthetic, recreation, interpretive and educational qualities of the sites could be degraded. Road construction and/or timber removal on slopes above sites could result in increased rates of erosion and soil slumpage onto sites. These adverse impacts would be most likely to occur under Alternative 1 and least likely under Alternative 5.

The alteration of the landscape and vegetation near a known cultural site could disturb its visual setting integrity and reduce the site's esthetic appeal for recreation, interpretation and education. Such impacts to the visual setting of cultural sites would be most likely under Alternatives 1 and 2 and least likely under Alternative 5.

Analysis indicates that no significant visual setting impacts would occur as a result of timber sales proposed in the sample 5-year timber sale plan. Additional site specific analysis will be included in the environmental assessments which precede each timber management action. Should potential impacts to a site's setting integrity be identified, design art techniques and other constraints used to meet visual resource management objectives (see Impacts on Visual Resources) may serve to mitigate adverse impacts.

Conclusions

Appropriate measures would be taken to identify and protect cultural sites prior to ground-disturbing activities under the proposed action and all alternatives. Undiscovered cultural sites would be susceptible to considerable alteration due to artifact breakage or destruction, displacement of horizontal and vertical relationships and contamination of organic materials, which compose a site's major scientific values. Once a site is found, however, mitigation measures would ensure that any future damage is minimized or avoided. Under the proposed action and Alternatives 3 through 10, sites discovered before logging would be managed to protect scientific and/or interpretive values.

Under Alternatives 1 and 2, only sites determined eligible for the National Register would be protected in place, and appropriate measures for data recovery would be developed for all other cultural sites resulting in an irretrievable loss of some information.

IMPACTS ON VISUAL RESOURCES

During the land use planning process, visual resource management (VRM) classes as described in Chapter 2 (see Figure 2-4) may be changed to resolve conflicts between visual and other resources (BLM Manual 8411). Downgrading VRM classes increases the potential for adverse visual impacts. As an example, an area in the affected environment recommended as VRM Class II subsequently managed as Class III or IV would receive less protection. Table 3-13 gives total acres for each VRM class by alternative and also indicates class downgrading (-) and upgrading (+) relative to those VRM class standards recommended through an inventory and evaluation of the affected environment.

Most timber management practices disrupt the land surface, change vegetative patterns, alter species composition, and thereby create visible contrasts (see Glossary) in the landscape. Assessing contrast for a proposed activity can indicate the severity of impact and help identify mitigation measures to reduce the contrast and meet VRM class objectives for an area (BLM Manual 8440). Environmental assessments will address site specific visual impacts and apply the Bureau's contrast rating system (see Glossary) to specific timber management actions. In many situations, overall contrast for a viewshed is dependent on forest management activities on intermingled private lands. Land ownership patterns (see Figure 1-1) often limit opportunities for the BLM to maintain or improve area-wide scenic quality. In some cases, BLM timber management activities would be consistent with surrounding areas and would not create significant contrasts.

Clearcutting, yarding, road construction, burning, and herbicide application can create significant adverse visual impacts. Clearcutting can create strong contrasts by changing vegetative patterns. Yarding can intensify the contrast by exposing disturbed soils to view. Tractor and ground lead yarding systems (41 percent of the acreage to be clearcut) would produce the highest degree of adverse visual impacts. Impacts of partial suspension systems (53 percent) would be less, and impacts would be least under full

Table 3-13 VRM Class Changes (Acres)

VRM Class	Affected Environment 1/	Proposed Action, and Alternatives 3, 4, 6, 7, 8 and 9	2/ Alternatives 1 and 2	3/ Alternative 5	Alternative 10
I	3,000				
Gain		+ 4,960	0	+ 9,900	+ 1,701
Loss		- 720	- 2,855	- 0	- 0
Total		7,200	145	12,900	4,701
II	22,240				
Gain		+ 440	0	0	0
Loss		- 17,160	- 22,240	- 9,460	- 19,559
Total		5,520	0	12,780	2,681
III	20,520				
Gain		+ 13,200	0	0	0
Loss		- 6,920	- 20,520	- 440	- 9,595
Total		26,800	0	20,080	10,925
IV	198,299				
Gain		+ 12,640	0	0	0
Loss		- 6,400	-198,299	- 0	-198,299
Total		204,539	0	198,299	0
TOTAL	244,059	244,059	145	244,059	18,307

1/ VRM class acreage as recommended through the visual resource inventory and evaluation of the existing environment (see Figure 2-4).

2/ Under these alternatives, VRM class downgrading (-) would occur on 20,600 acres; VRM class upgrading (+) would occur on 10,640 acres.

3/ Under these alternatives, only existing Research Natural Areas and Outstanding Natural Areas would be managed under VRM Class I objectives. Other areas would not be constrained by VRM considerations.

suspension systems (6 percent). Road construction could create strong long-term contrasts, depending upon the extent of cut and fill slopes visible and the success of vegetative reestablishment in disturbed areas. Slash burning would lessen the contrast of objectionable timber harvest debris, but could also produce short-term adverse contrasts of a different nature on the burned area, as well as through the effects of smoke on visibility (see Impacts on Air Quality). In the short-term, vegetation sprayed with herbicides would create strong contrasts. In the long term, vegetative variety would be reduced as herbicides encourage conifers at the expense of other vegetation (e.g. hardwood and non-coniferous) of high visual interest.

Table 3-14, summarizes the potential impacts of the proposed action's sample 5-year timber sale plan with visual resources. Sample sale units not listed in Table 3-14 are in Class IV areas or would not be clearcuts.

Following application of the contrast rating system, necessary mitigation measures would be identified. Depending upon VRM class objectives, possible mitigation measures under the proposed action and all alternatives except 1 and 2 include manipulating the size and shape of clearcut units, partial cutting, longer harvest cycles (see Table 1-3), screening with buffer strips, hydromulching road cuts and fills, complete debris disposal and replanting with a conifer mixture. The adverse impacts of herbicide use would go unmitigated and would occur under all alternatives except Alternative 8.

Conclusions

Alternative 5 provides the highest degree of protection for visual resources. Most adverse visual impacts in highly scenic and/or sensitive areas would not occur or would be mitigated. Unmitigated impacts would include the visual effects of herbicide spraying.

Adverse visual impacts under the proposed action and Alternatives 3, 4 and 6 through 9 would be low. Most highly scenic and/or sensitive areas would be protected. Attempts would be made to mitigate visual impacts on all public lands. However, the adverse visual impacts of herbicide use would go unmitigated (except for Alternative 8). Further, the potential for adverse visual impacts would increase in areas where VRM classes were downgraded (see Table 3-13).

Under Alternative 10, adverse visual impacts would be moderate. Some protection would be provided for certain highly scenic and/or sensitive areas.

Adverse visual impacts would be greatest under Alternatives 1 and 2. The visual resources of only 145 acres of public land would be protected (see Table 3-13). All other public land would be managed without consideration for visual resources and measures would not be implemented to mitigate adverse visual impacts.

Table 3-14 Potential Impacts of the Sample Five-Year Timber Sale Plan on Visual Resources

Affected Environment					
VRM Class 1/	Scenic Quality Rating Unit 2/	Scenic Quality 3/	Sensitivity Level 4/	Distance Zone 5/	Number of Clearcut Units With Potential Impacts
II	Scappoose-Vernonia Highway	B	H	FM	1
	Nestucca Access Road	A	H	FM	13
	Nestucca River Road	B	H	FM	2
	Highway 6	B	H	FM	1
	Kilchis River Road	B	H	FM	5
	Willamina Creek Road	B	H	FM	2
	Gilbert Creek Road	B	H	FM	1
	Highway 18	B	H	FM	1
	Highway 34	B	H	FM	2
	Beaver Creek Road	B	H	FM	2
III	Jarrell Pederson, Johnson and Beck, Moreland Roads	B	M	FM	1
	Highway 30	C	H	FM	1
	Elk Creek Road	B	M	FM	3
	Bible Creek Access Road	B	M	FM	1
	Bald Mountain Access Road	B	M	FM	12
	Coast Creek Road	B	M	FM	2
	Feagles Creek Road	B	M	FM	1
	Elk Creek Road	B	M	FM	1
	Klickitat-North Fork Alsea Access Road	B	M	FM	4
	Lobster Valley & Preacher Creek Roads	C	H	FM	3
	Prairie Peak Road	B	M	FM	3
	Fall Creek Road	B	M	FM	3

1/ Recommended VRM Class based upon an inventory and evaluation of the existing environment (see Figure 2-4).
2/ See Glossary.
3/ Scenic quality (see Glossary) is classified as A-high, B-moderate or C-low.
4/ Sensitivity levels (see Glossary) are shown as H-high, M-medium or L-low.
5/ All potential impacts listed would be in the FM-foreground/middleground distance zone (see Glossary).

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Area of Critical Environmental Concern (ACEC) designation would improve management focus and provide guidelines to help achieve protection of important and relevant resource values. The proposed action and alternatives vary in levels of ACEC designation. Some of the potential ACECs are also designated or proposed for other protective designation (see Table 2-12).

Under Alternative 5, 15 areas (11,175 acres) would be designated. Under the proposed action and Alternatives 6 through 9, 15 areas (10,981 acres) are identified for ACEC designation. Alternatives 3 and 4 call for the designation of 13 areas (7,276 acres) placing 410 acres on Sheridan Peak and Marys Peak in the intensive timber production base. Under Alternative 2, four areas (505 acres) would be designated as ACECs. Alternatives 1 and 10 have no provision for designation of ACECs.

Analysis of the sample 5-year timber sale plan indicates that 15 sales would be within the caution zone of the Nestucca River proposed ACEC (see Impacts on Recreation). Special management requirements resulting from ACEC designation, under the proposed action and all alternatives except 1,2, and 10, would serve to mitigate potential adverse impacts to the critical values of this area.

SPECIAL AREAS

Impacts to designated and proposed Research Natural Areas, Outstanding Natural Areas, four potential National Natural Landmarks and the Nestucca River proposed recreation lands are discussed in the preceding section on Impacts to Areas of Critical Environmental Concern. The North Fork and South Fork Alsea River proposed recreation lands are discussed in the section dealing with Impacts on Recreation.

Two factors were examined to determine impacts to Table Mountain potential National Natural Landmark. This area was analyzed in relation to the TPCC status of public lands within the area's general boundaries (see Appendix A) and for possible conflicts with the sample 5-year timber sale plan. Table Mountain has 640 acres of BLM-administered commercial forest land proposed for intensive timber management.

One timber sale in the sample 5-year timber sale plan, with about 200 acres of clearcutting in 4 units, would significantly impact the Table Mountain potential National Natural Landmark. Further, vegetative disturbance, soil compaction and erosion near the area may increase the adverse impacts.

The ecological and biological merits of Table Mountain would be adversely impacted by timber management operations. Under the proposed action and each alternative, the degree of impacts would be relative to each alternative's emphasis on timber harvest. Impacts would be most significant under Alternative 1 and least significant under Alternative 5. Site specific impacts to special areas will be further analyzed in the environmental assessments which precede each timber management action.

IMPACTS OF HERBICIDES ON HUMAN HEALTH

The possibility of human health being impacted by the proposed use of herbicides on the acres to be treated is related to the likelihood of exposure and the toxicity of the chemicals proposed for use (Norris 1975). Treated acres would range from 11,777 in Alternative 5 to 22,687 in Alternative 1. In general, exposure of humans to herbicides can occur in two ways: directly, as in the case of applicators, or indirectly. The number of persons that could be directly affected by herbicide application in the planning area is very small. Indirect exposure from contact with recently sprayed vegetation or contaminated streams is more likely to occur than is direct contact. Planned delivery techniques would reduce or prevent spray from drifting onto streams and water bodies. Areas to be sprayed would be posted. Contact with newly sprayed vegetation could occur should someone traverse a sprayed area. However, the effect, if any, of such contact would be minimal.

Particular care would be taken to avoid exposure of any residents within 1 mile of spray areas proposed in the 10-year timber management plan. Residents within one-half mile would be notified prior to spraying.

The chance that humans exposed to herbicides used in timber management would be adversely impacted is related to the toxicity of the herbicides. The LD_{50} refers to amount of compound or active ingredient, in milligrams per kilograms of body weight of test animals, that it would take to kill 50 percent of the population of test animals. The larger the LD_{50} number, the less harmful the tested compound. Compounds proposed for use in the SYUs are Asulam (Asulox) which is practically non-toxic (LD_{50} rats > 8,000 mg/kg), Krenite, which is relatively harmless (LD_{50} rats 24,400 mg/kg); glyphosate (Roundup) which is slightly toxic (LD_{50} rats 4,900 mg/kg), picloram (Tordon) which is practically non-toxic (LD_{50} rats 8,200 mg/kg) and 2,4-D, which is moderately toxic to slightly toxic (LD_{50} rats 300-1,000 mg/kg, depending on formulation). It is expected that exposure under most circumstances would not result in injury to human beings.

The low volatile ester of 2,4-D used in timber management is moderately toxic to humans. The use of 2,4-D in forestry has recently been challenged by groups which contend it is hazardous to human health. Some laboratory tests, not substantiated under field conditions where applications levels are lower than in lab tests, indicate that it has potential for chronic effects such as teratogenicity (fetal deformation) (Courtney 1975), fetotoxicity to birds, and carcinogenicity (Hansen et al. 1971). A breakdown component of 2,4-D, 2,4-Dichlorophenol, has been implicated as a co-carcinogen in mice (Boutwell and Bosch 1959 In Shearer and Halter 1980). Careful planning of treatment areas and handling of 2,4-D will minimize the chance of exposure.

In 1978, Frank Dost (USDA, FS 1978b) completed a review of the research literature that described the toxicology of phenoxy herbicides. Dost's review of the toxicity of 2,4-D to humans revealed several incidents of poisoning in humans involving highly concentracted doses of 2,4-D. He also described reports of the effects of 2,4-D esters being absorbed through the skin from accidental spills. Those effects ranged from unusual fatigue, nausea, vomiting and weight loss from first exposures to serious peripheral neurological effects when the victim was exposed a second time.

2,4-Dichlorophenol (2,4-DCP), a breakdown component of phenoxy herbicides, has been found to be incorporated into soil humus complexes by microbial activity. Such xenobiotic compounds may persist in the soil organic matter and constitute a delayed environmental problem (Bollag et al. 1980). This 2,4-DCP, like other polychlorinated phenols, when burned, can form a dioxin, but not TCDD (2,3,7,8 - tetrachlorodibenzo - p - dioxin) which is found in 2,4,5-T and silvex. The most likely dioxin produced from heating, if one should form, would be 2,7 - dichlorodibenzo - p - dioxin, reported to be minimally toxic (Epstein 1970; Schulze et al. 1973, Cited in Shearer and Halter 1980).

The Environmental Protection Agency recently reviewed all the available research about potential health effects of 2,4-D. Based on this review, the EPA concluded that the continued use of 2,4-D does not pose an imminent hazard or unreasonable adverse effect when used according to label precautions and directions for use (U.S. EPA 1980). EPA has asked manufacturers to conduct more tests to bring the knowledge about 2,4-D up to standards currently required for the registration of new chemicals.

Some pesticides currently available and in use by BLM were at one time supported for registration by laboratory tests conducted by Industrial Biotest Labs (IBT). Various tests done by IBT were found to be invalid 5 to 6 years ago (U.S. EPA 1977). At that time, EPA initiated investigations to determine if the invalidity of these tests created data gaps so critical that use of any pesticide supported in registration by IBT tests created an immediate hazard to humans and/or the environment. It has not been determined that these invalid tests have created such an imminent risk.

Public concern over the continuing use of herbicides in forestry resulted in a joint position statement issued in April 1981 by the U.S. Forest Service, Environmental Protection Agency and the U.S. Bureau of Land Management. This statement concluded that, "An assessment of current data on these chemicals (Asulam, Dicamba, Krenite MSMA, Picloram, Atrazine, 2,4-D and Simazine) coupled with the anticipated exposure indicates no reason to believe that they are posing an unreasonable risk to human health or the environment when used in accordance with the label requirements."

IMPACTS ON ENERGY USE

Table 3-15 indicates the energy investment required, by alternative, as expressed in British thermal units (Btu's - see Glossary). It is assumed that all energy consumed would be in the form of fossil fuels or derivatives, and any energy investment would constitute an irretrievable reduction of world supplies of petroleum-derived energy. Table 3-15 further illustrates that the majority of energy consumed is attributable to road development and care and log production (all actions taken to harvest trees and get logs to the mill).

The annual energy consumption ranges from .650 trillion Btu's (Alternative 5) to 1.216 trillion Btu's (Alternative 1). If the .973 trillion Btu's attributable to the proposed action were all expended in the form of gasoline, it would equate to 7.8 million gallons or about 0.6 percent of the 1.290 billion gallons of gasoline consumed in Oregon in 1980. This energy investment is about 0.2 percent of the projected 1980 Oregon total of 581 trillion Btu's (Oregon Department of Energy 1980).

Table 3-15 Estimated Annual Energy Consumption Attributable to the Proposal and Alternatives

Proposed Action

Treatment	Units	Estimated Cost per Unit 1/ ($)	Assumed Energy Requirement per $ of Cost (1,000 Btu's)	Energy Consumption (1,000,000 Btu's)
ROADS				
New Construction	17.3 miles	60,000	80	83,040
Reconstruction	12.0 miles	20,000	60	14,400
LOG PRODUCTION (all actions taken to cut trees and get logs to the mill)	149,000 M.bd.ft.	100	55	819,500
SITE PREPARATION				
Broadcast Burning	2,072.6 acres	300	31	19,275
Herbicide 2/	540.0 acres	60	122	3,953
Mechanical	430.0 acres	200	30	2,580
Stand Conversion	101.0 acres	200	30	606
HERBICIDE				
Plantation Release 2/	1,300.0 acres	60	122	9,516
PLANTING	3,050.5 acres	115	31	10,875
THINNING				
Precommercial	358.1 acres	100	31	1,110
FERTILIZATION 3/	428.0 acres	100	122	5,222
PLANTATION PROTECTION	959.0 acres	93	31	2,765
Total				972,842

Energy Requirements for the Proposed Action and Alternatives

	Proposed Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8 4/	Alt. 9	Alt. 10 5/
Total Energy Consumption (Trillion Btu's)	.973	1.215	1.128	1.053	.910	.649	1.007	.921	.943	.772	1.021

1/ BLM estimated costs per units were often a range of values. The listed costs were selected as indicative of the EIS area. Similarly, DOE energy requirements were also given as a range in some cases.

2/ Diesel carrier (when used) has been considered in determining costs and energy requirements for herbicide application.

3/ Costs and energy requirements for fertilization account for the conversion of petroleum-based raw materials for manufacture and energy requirements for delivery and application.

4/ Manual methods for plantation release have been considered during the computation of energy use for Alternative 8.

5/ Total shown does not include energy consumption attributable to site preparation with herbicide and mechanical methods, plantation protection and plantation maintenance and release. These treatments would be carried out to the degree necessary to maintain the allowable cut plan implemented in 1972. It is estimated that energy use attributable to these four treatments would be about 20 billion Btu's resulting in a total energy use under Alternative 10 of about 1.041 trillion Btu's.

Source: BLM data except for assumed energy requirements per dollar of cost, which were derived by Department of Energy, Region X Staff.

IMPACTS ON SOCIOECONOMIC CONDITIONS

The socioeconomic impacts are presented here for two different bases as a means of differentiating between the effects of potential timber management programs on existing socioeconomic conditions and their effects on the conditions expected to occur if the current timber management program were continued. The program manager must know how future conditions would be affected if the program were changed. The public is generally most concerned with how future conditions would differ from existing conditions. The impacts are presented mainly in table form, first, as changes measured from the existing condition and second, as changes measured from the no action condition, the condition expected if the current program were continued.

Figure 3-2 is presented here to help place these bases for impact measurement, the existing condition and no action condition, in context. The existing condition for timber industry impacts is represented by the average harvest (122.6 MM bd. ft.) during the 1975-77 period (as described in Chapter 2). This harvest level is below the average for the decade but approximates more recent levels. The no action condition is represented by planned sales under the present program, an annual average of 156 million board feet.

Short-Term Economic Impacts

Tables 3-16 and 3-17 show projections representing average local employment and earnings dependent on timber sales under the proposed action and the alternatives during the first decade after implementation. Impacts on employment and earnings would be phased in over a period of 2 or 3 years due to the customary time lag between sale and harvest. Impacts on receipts would be delayed an additional year.

While it is anticipated that labor productivity will increase in future years leading to fewer jobs per unit of production (Wall 1979), in order to simplify the impact estimates they have not been adjusted to reflect productivity changes. The effect of this simplification is to overstate the impacts on employment and earnings by about 10 percent in the short term and possibly by greater amounts in the long term.

As shown in Table 3-16, continuation of the current management program (Alternative 10) would increase local employment in timber harvesting and processing by 247 workers over the number employed under the existing condition (data for the existing condition is shown in the first column of the table.) Employment in forest management activities not normally performed in conjunction with logging would remain at the same level as in the existing condition. The equivalent of 14 full-time workers would be employed on a number of seasonal and intermittent activities such as tree planting and brush control. Almost 800 more workers in all would be employed, and $8,471,000 more would be earned annually than in the existing condition. Compared to the existing condition, all alternative programs (including the proposed action) would have positive impacts except Alternatives 5 and 9. Alternative 5 would cause the loss of 179 timber

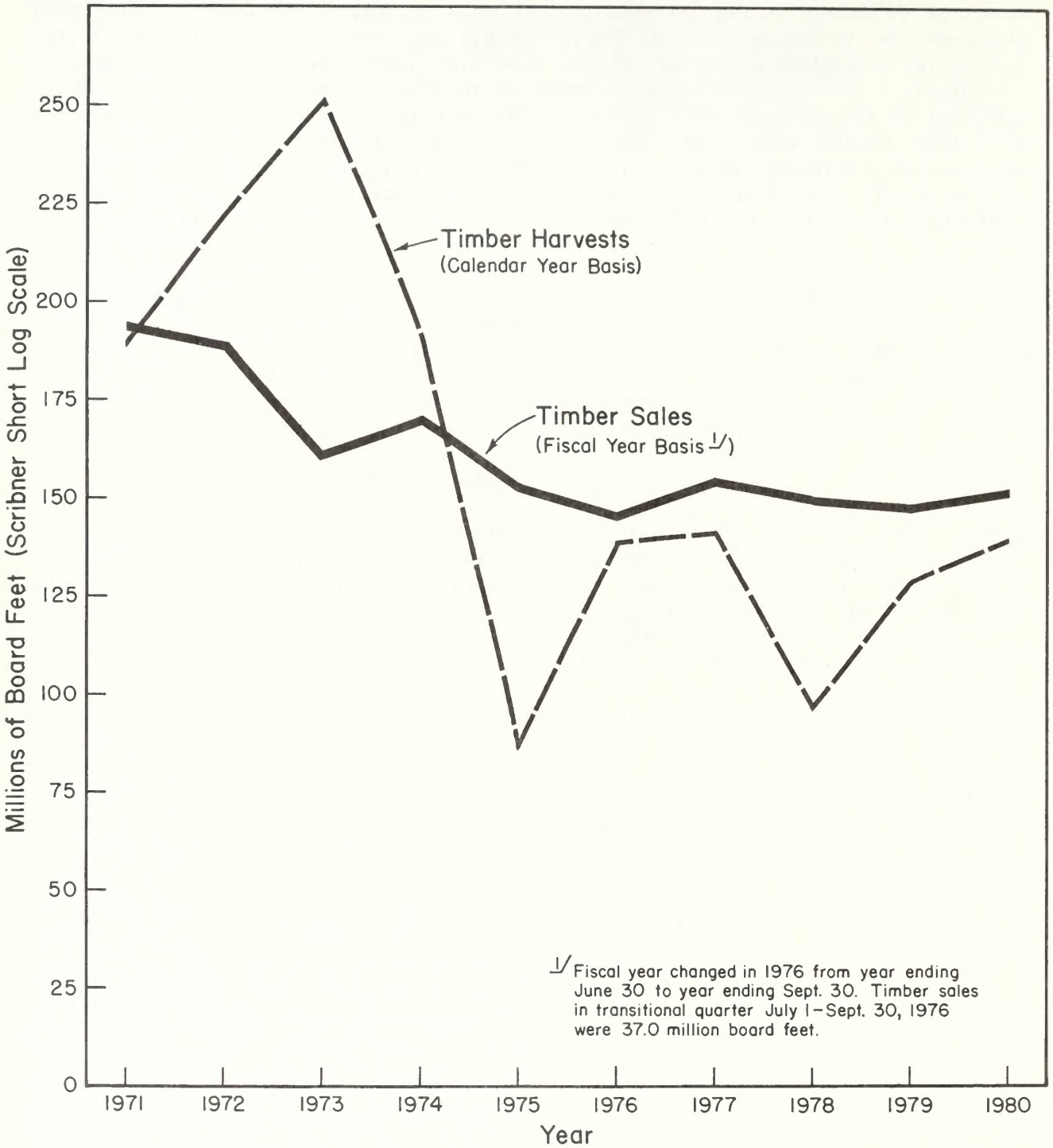


FIGURE 3-2
TIMBER SALES AND HARVESTS
WSSYUs 1971-1980

Table 3-16 Short-Term Impacts Compared to Existing Condition on Local Employment and Earnings Related to Timber Harvest
(Average annual amounts during first decade earnings in thousands of 1978 dollars)

	Existing Condition 1/	Change From Existing Condition										
		Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt.10 2/ No Action
BENTON COUNTY												
Timber industry employment	183	+39	+99	+78	+59	+27	-36	+48	+26	+34	-14	+49
Logging & processing 3/	180	+39	+99	+78	+59	+27	-35	+48	+26	+34	-13	+49
Forest management 4/	3	-	-	-	-	-	-1	-	-	-	-1	-
Total employment 5/	637	+135	+344	+273	+206	+94	-124	+165	+89	+120	-47	+171
Total earnings	$7,270	+$1,540	+$3,931	+$3,115	+$2,356	+$1,073	-$1,416	+$1,890	+$1,015	+$1,365	-$ 541	+$1,948
COLUMBIA COUNTY												
Timber industry employment	71	+15	+39	+31	+23	+11	-14	+19	+10	+14	-5	+19
Logging & processing 3/	71	+15	+39	+31	+23	+11	-14	+19	+10	+14	-5	+19
Forest management 4/	-	-	-	-	-	-	-	-	-	-	-	-
Total employment 5/	130	+28	+71	+56	+43	+19	-25	+34	+18	+25	-9	+35
Total earnings	$1,796	+$ 387	+$ 987	+$ 782	+$ 592	+$ 270	-$ 346	+$ 475	+$ 255	+$ 343	-$ 126	+$ 489
LINCOLN COUNTY												
Timber industry employment	104	+22	+56	+44	+34	+15	-21	+27	+14	+19	-7	+28
Logging & processing 3/	102	+22	+56	+44	+34	+15	-20	+27	+14	+19	-7	+28
Forest management 4/	2	-	-	-	-	-	-1	-	-	-	-	-
Total employment 5/	384	+81	+207	+164	+124	+57	-76	+100	+53	+72	-26	+103
Total earnings	$3,895	+$ 823	+$2,100	+$1,664	+$1,259	+$ 573	-$ 773	+$1,009	+$ 542	+$ 729	-$ 268	+$1,041
POLK COUNTY												
Timber industry employment	205	+44	+113	+88	+67	+30	-40	+54	+29	+39	-14	+55
Logging & processing 3/	203	+44	+112	+88	+67	+30	-39	+54	+29	+39	-14	+55
Forest management 4/	2	-	+1	-	-	-	-1	-	-		-	-
Total employment 5/	756	+161	+415	+326	+247	+112	-148	+198	+106	+143	-52	+204
Total earnings	$7,520	+$1,604	+$4,131	+$3,244	+$2,454	+$1,118	-$1,470	+$1,968	+$1,057	+$1,421	-$ 522	+$2,029
TILLAMOOK COUNTY												
Timber industry employment	119	+25	+64	+51	+39	+16	-23	+30	+15	+23	-9	+31
Logging & processing 3/	114	+25	+63	+50	+38	+17	-22	+30	+16	+22	-8	+31
Forest management 4/	5	-	+1	+1	+1	-1	-1	-	-1	+1	-1	-
Total employment 5/	238	+49	+117	+101	+77	+32	-46	+60	+30	+45	-18	+62
Total earnings	$3,030	+$625	+$1,621	+$1,290	+$982	+$410	-$584	+$767	+$386	-$579	-$229	+$ 791
WASHINGTON COUNTY												
Timber industry employment	56	+12	+31	+24	+18	+8	-11	+15	+8	+11	-4	+15
Logging & processing 3/	56	+12	+31	+24	+18	+8	-11	+15	+8	+11	-4	+15
Forest management 4/	0	-	-	-	-	-	-	-	-	-	-	-
Total employment 5/	121	+26	+66	+53	+40	+18	-23	+32	+17	+23	-8	+33
Total earnings	$1,696	+$ 365	+$ 933	+$ 739	+$ 559	+$ 255	-$ 327	+$ 448	+$ 241	+$ 324	-$ 119	+$ 462
YAMHILL COUNTY												
Timber industry employment	182	+39	+100	+78	+59	+27	-35	+48	+26	+35	-13	+49
Logging & processing 3/	180	+39	+99	+78	+59	+27	-35	+48	+26	+34	-13	+49
Forest management 4/	2	-	+1	-	-	-	-	-	-	+1	-	-
Total employment 5/	707	+151	+388	+304	+230	+105	-135	+185	+99	+137	-49	+190
Total earnings	$7,351	+$1,566	+$4,037	+$3,167	+$2,396	+$1,091	-$1,399	+$1,921	+$1,032	+$1,428	-$ 510	+$1,981
EIS AREA												
Timber industry employment	920	+195	+502	+394	+299	+135	-179	+239	+127	+175	-66	+247
Logging & processing 3/	906	+195	+499	+393	+298	+136	-175	+239	+128	+173	-64	+247
Forest management 4/	14	-	+3	+1	+1	-1	-4	-	-1	+2	-2	-
Total employment 5/	2,973	+631	+1,540	+1,277	+967	+437	-577	+774	+412	+565	-209	+798
Total earnings	$32,558	+$6,910	+$17,740	+$14,001	+$10,598	+$4,790	-$6,315	+$8,478	+$4,528	+$6,189	-$2,315	+$8,741

1/ Existing condition is based on 1975-77 average harvest of 122.6 million board feet per year. These estimates differ from those in Table 2-16 because of the inclusion of forest management employment.
2/ No action condition in this table shows the change from the existing situation which would occur if the existing program were continued.
3/ Logging and processing includes all timber industry employment as presented in Table 2-17. Estimated here by ratio of timber industry employment generated in county to total harvest from BLM lands in the EIS area as derived from Table 2-17.
4/ Forest management employment represents the employment of workers normally classified in other industries but included in the timber manufacturing industry here for convenience because of their small values. See Appendix D for their calculations.
5/ For the various alternatives, total employment includes the changes in employment in all industries resulting from the change in timber industry employment (also included).

Table 3-17 Short-Term Impacts Compared to No Action Condition on Local Employment and Earnings
(Average annual amounts during first decade, earnings in thousands of dollars)

Item	Projected County Total (1985) 1/	Change From No Action Condition: Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	No Action Condition (Alt.10) 2/
BENTON COUNTY												
Timber industry employment	1,825	-10	+50	+29	+10	-22	-85	-1	-23	-15	-63	232
Logging & processing 3/	NA	-10	+50	+29	+10	-22	-84	-1	-23	-15	-62	229
Forest management 4/	NA	-	-	-	-	-	-1	-	-	-	-1	3
Total employment 5/	34,300	-36	+174	+102	+36	-77	-295	-5	-82	-51	-218	807
Total earnings	$ 391,700	-$408	+$1,983	+$1,167	+$408	-$875	-$3,364	-$58	-$933	-$583	-$2,489	$9,218
COLUMBIA COUNTY												
Timber industry employment	2,250	-4	+20	+12	+4	-9	-33	-1	-9	-6	-24	90
Logging & processing 3/	NA	-4	+20	+12	+4	-9	-33	-1	-9	-6	-24	90
Forest management 4/	NA	-	-	-	-	-	-	-	-	-	-	-
Total employment 5/	11,875	-7	+36	+21	+7	-16	-60	-1	-17	-11	-44	165
Total earnings	$ 164,500	-$103	+$498	+$293	+$103	-$220	-$835	-$15	-$234	-$146	-$615	$2,285
LINCOLN COUNTY												
Timber industry employment	1,700	-6	+28	+17	+6	-12	-48	-1	-13	-8	-35	132
Logging & processing 3/	NA	-6	+28	+17	+6	-12	-47	-1	-13	-8	-35	130
Forest management 4/	NA	-	-	-	-	-	-1	-	-	-	-	2
Total employment 5/	15,675	-22	+104	+61	+22	-46	-179	-3	-49	-31	-129	487
Total earnings	$ 159,000	-$218	+$1,059	+$623	+$218	-$467	-$1,813	-$31	-$498	-$312	-$1,309	$4,935
POLK COUNTY												
Timber industry employment	1,575	-12	+57	+33	+12	-25	-95	-2	-26	-17	-70	260
Logging & processing 3/	NA	-12	+56	+33	+12	-25	-94	-2	-26	-17	-70	258
Forest management 4/	NA	-	+1	-	-	-	-1	-	-	-	-	2
Total employment 5/	16,000	-43	+211	+122	+43	-92	-352	-6	-98	-61	-256	960
Total earnings	$ 159,200	-$425	+$2,102	+$1,215	+$425	-$911	-$3,499	-$61	-$972	-$607	-$2,551	$9,549
TILLAMOOK COUNTY												
Timber industry employment	1,125	-7	+33	+20	+8	-15	-54	-1	-16	-8	-40	150
Logging & processing 3/	NA	-7	+32	+19	+7	-14	-53	-1	-15	-9	-39	145
Forest management 4/	NA	-	+1	+1	+1	-1	-1	-	-1	+1	-1	5
Total employment 5/	8,625	-13	+65	+39	+15	-30	-108	-2	-32	-17	-80	300
Total earnings	$ 109,900	-$166	+$830	+$499	+$191	-$381	-$1,375	-$24	-$404	-$211	-$1,020	$3,821
WASHINGTON COUNTY												
Timber industry employment	2,175	-3	+16	+9	+3	-7	-26	-	-7	-5	-19	71
Logging & processing 3/	NA	-3	+16	+9	+3	-7	-26	-	-7	-5	-19	71
Forest management 4/	NA	-	-	-	-	-	-	-	-	-	-	-
Total employment 5/	118,500	-7	+33	+20	+7	-15	-56	-1	-16	-10	-41	154
Total earnings	$1,666,000	-$97	+$470	+$277	+$97	-$208	-$789	-$14	-$221	-$138	-$581	$2,158
YAMHILL COUNTY												
Timber industry employment	2,300	-10	+51	+29	+10	-22	-84	-1	-23	-14	-62	231
Logging & processing 3/	NA	-10	+50	+29	+10	-22	-84	-1	-23	-15	-62	229
Forest management 4/	NA	-	+1	-	-	-	-	-	-	+1	-	2
Total employment 5/	22,500	-40	+198	+114	+40	-86	-325	-6	-91	-53	-239	897
Total earnings	$ 234,000	-$415	+$2,057	+$1,186	+$415	-$890	-$3,380	-$59	-$949	-$553	-$2,491	$9,332
EIS AREA												
Timber industry employment	12,950	-52	+254	+148	+52	-112	-426	-8	-120	-72	-313	1,167
Logging & processing 3/	NA	-52	+251	+147	+51	-111	-422	-8	-119	-74	-311	1,153
Forest management 4/	NA	-	+3	+1	+1	-1	-4	-	-1	+2	-2	14
Total employment 5/	227,475	-168	+821	+479	+170	-362	-1,375	-24	-385	-234	-1,007	3,770
Total earnings	$2,884,300	-$1,832	+$8,999	+$5,260	+$1,857	-$3,952	-$15,055	-$262	-$4,211	-$2,560	-$11,056	$41,298

NA - Not available.

1/ Employment projections from Bonneville Power Administration, Oregon Population, Employment and Households Projected to 2000, September 1979.

2/ No action condition reflects the amount of employment and income expected to be generated under the existing program.

3/ Logging and processing includes all timber industry employment as presented in Table 2-17. Estimated here by ratio of timber industry employment generated in county to total harvest from BLM lands in the EIS area as derived from Table 2-17.

4/ Forest management employment represents the employment of workers normally classified in other industries but included in the timber manufacturing industry here for convenience because of their small values. See Appendix G for their calculation.

5/ For the various alternatives, total employment includes the changes in employment in all industries resulting from the change in timber industry employment (also included).

industry jobs and 577 jobs in the economy as a whole, and would reduce income by $6,315,000 in the EIS area. For the individual counties, reductions in total employment caused by Alternative 5 when converted to percentage terms would amount to:

County	Percent	County	Percent
Benton	-0.5	Tillamook	-0.6
Columbia	-0.2	Washington	-0.0
Lincoln	-0.6	Yamhill	-0.6
Polk	-0.8		

The local communities dependent on BLM timber supplies, as cited in Chapter 2 would probably experience similar impacts, but there is not enough information available to quantify them. Alternative 1 would have the greatest positive economic impacts.

As shown in Table 3-17, the total employment generated in the seven-county area by a continuation of current WSSYUs management (no action condition) would average 3,770 jobs, and income generated as measured by worker earnings would amount to $41,298,000 in 1978 dollars.

As compared with a continuation of current management, the proposed action would sustain about 52 fewer jobs in the timber industry and 168 fewer jobs in the local economy as a whole (including the lumber industry). Local income would be reduced $1,832,000. As shown in Table 3-17, employment and earnings would be slightly less in each of the counties. Impacts on employment and earnings for the other alternatives are also shown in Table 3-17. Adverse impacts would result from the proposed action and Alternatives 4 through 9. The greatest adverse impacts would occur under Alternative 5.

Table 3-18 and 3-19 show impacts on income and employment related to fisheries, hunting and other recreation. Compared to the existing condition (Table 3-18), the only negative impacts related to these activities would occur in fisheries-related income and employment for Alternatives 1, 2 and 10.

Compared to the No Action Condition (Table 3-19), impacts related to these activities are positive except where there are no impacts (Alternatives 1 and 2). Under the proposed action, income and employment related to the fisheries dependent on the habitat of the EIS area would be increased about 6 percent over the no action condition.

Table 3-18 Short-Term Impacts Compared to Existing Condition on Local Employment and Earnings Related to Fisheries, Hunting and Other Recreation (Income in thousands of 1975 dollars)

Alternative	Fisheries 1/		Hunting		Other Recreation	
	Income	Employment	Income	Employment	Income	Employment
Proposed Action	+$304	+41	+$ 37	+6	+$227	+37
1. Max. Tbr.	- 601	-77	+ 27	+5	+ 99	+16
2. Str. Tbr.	- 557	-73	+ 27	+5	+ 99	+16
3. Emp. Tbr.	+ 304	+41	+ 31	+5	+ 163	+27
4. Emp.Other	+ 304	+41	+ 27	+5	+ 227	+37
5. Full Eco.	+ 535	+73	+ 50	+8	+ 265	+44
6. Lo MHS	+ 304	+41	+ 37	+6	+ 227	+37
7. Hi MHS	+ 304	+41	+ 37	+6	+ 227	+37
8. No Herb.	+ 304	+41	+ 37	+6	+ 227	+37
9. No ACE	+ 304	+41	+ 37	+6	+ 227	+37
10. No Action	- 601	-77	+ 27	+5	+ 99	+16
Existing Condition 2/	$1,438	176	$270	45	$997	164

1/ Includes income and employment generated in other parts of Oregon and in Washington.

2/ Existing condition as described in Chapter 2. Impacts shown in this table represent amount of change measured from existing condition.

Table 3-19 Short-Term Impacts Comparted to Income and Employment Related to Fisheries, Hunting and Other Recreation (Income in thousands of dollars)

Alternative	Fisheries 1/		Hunting		Other Recreation	
	Income	Employment	Income	Employment	Income	Employment
Proposed Action	+$ 905	+ 119	+$10	+ 2	+$128	+ 21
1. Max. Tbr.	0	0	0	0	0	0
2. Str. Tbr.	+ 44	+ 4	0	0	0	0
3. Emp. Tbr.	+ 905	+ 119	+ 3	+ 1	+ 64	+ 11
4. Emp. Other	+ 905	+ 119	0	0	+ 128	+ 21
5. Full Eco.	+ 1,135	+ 150	+ 23	+ 4	+ 167	+ 27
6. Lo MHS	+ 905	+ 119	+ 10	+ 2	+ 128	+ 21
7. Hi MHS	+ 905	+ 119	+ 10	+ 2	+ 128	+ 21
8. No Herb.	+ 905	+ 119	+ 10	+ 2	+ 128	+ 21
9. No ACE	+ 905	+ 119	+ 10	+ 2	+ 128	+ 21
10. No Action	2/	2/	2/	2/	2/	2/
Expected Amounts under No Action	$ 837	99	$297	50	$1,097	180

1/ Includes income and employment generated in other parts of Oregon and in Washington

2/ There are no impacts under the No Action condition since in this table it serves as the base from which the impacts are measured.

The short-term impacts on earnings and employment related to timber production, fisheries, hunting and other recreation are summarized for each alternative below:

Alternative	For Existing Condition		For No Action Condition	
	Earnings	Employment	Earnings	Employment
Proposed Action	+$ 7,478,000	+ 715	-$ 789,000	- 26
1. Max. Tbr.	+ 17,265,000	+1,562	+ 8,999,000	+ 821
2. Str. Tbr.	+ 13,570,000	+1,225	- 5,304,000	+ 483
3. Emp. Tbr.	+ 11,096,000	+1,040	+ 2,829,000	+ 301
4. Emp. Other	+ 5,348,000	+ 520	- 2,919,000	- 222
5. Full Eco.	- 5,465,000	- 452	- 13,730,000	-1,194
6. Lo MHS	+ 9,046,000	+ 858	+ 781,000	+ 118
7. Hi MHS	+ 5,096,000	+ 496	- 3,168,000	- 243
8. No Herb.	+ 6,757,000	+ 649	- 1,517,000	- 92
9. No ACE	- 1,747,000	- 125	- 10,013,000	- 865
10. No Action	+ 8,266,000	+ 742	0	0

O&C revenues are currently low because harvests are not keeping pace with sales. In Table 3-20 the distribution of O&C revenues to counties for fiscal 1980 as a percentage of total property tax levies is shown as the existing condition. The impacts of the alternatives are calculated at average sales prices in the WSSYUs in fiscal 1980. They are shown as the change in county revenue as a percent of total levies. Because O&C harvests, and therefore collections, are currently low, all impacts are positive.

Impacts on O&C revenue distributions for the no action condition are shown in Table 3-21. O&C revenues from the WSSYUs would be affected by each of the alternatives approximately in direct proportion to the change in annual timber sale volume. Since all O&C monies are combined in a common fund, the effect of any change in local revenues is shared equally by the O&C fund participants. In this comparison, the proposed action and Alternatives 4 through 9 would have negative impacts while Alternatives 1 and 2 would have positive impacts. O&C fund participants-- O&C counties, BLM and the Federal treasury-- would each receive their proportionate share of the receipts.

Payment to the State from revenues from public domain lands would be increased compared to the present condition, but compared to the no action condition they would be less by about $19,000 annually under the proposed action and by $151,000 under Alternative 5, the largest variation which would occur. Alternative 1 would increase the payments by $90,000.

Long-Term Economic Impacts

Long-term impacts related to timber production for each alternative would generally be very similar to short-term impacts. Impacts on local employment and earnings would be reduced over time if worker productivity continued to

Table 3-20 Short Term Impacts Compared to Existing Condition on O&C Revenue Distribution
(Percent supplement to 1980-81 total levies)

County	1980-81 Total Levies ($1000)	% Share O&C Payment	Existing Condition Base 1/	Change from Existing Condition 2/										
				Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt. 10 No Actio
Benton	26,018	2.81	10.5	+ 1.5	+ 2.3	+ 2.0	+ 1.8	+ 1.3	+ 0.5	+ 1.6	+ 1.3	+ 1.4	+ 0.8	+ 1.6
Clackamas	117,365	5.55	4.6	+ 0.7	+ 1.0	+ 0.9	+ 0.8	+ 0.6	+ 0.2	+ 0.7	+ 0.6	+ 0.6	+ 0.4	+ 0.7
Columbia	17,218	2.06	11.7	+ 1.7	+ 2.5	+ 2.2	+ 2.0	+ 1.5	+ 0.6	+ 1.8	+ 1.5	+ 1.6	+ 0.9	+ 1.8
Coos	22,794	5.90	25.3	+ 3.6	+ 5.5	+ 4.8	+ 4.2	+ 3.2	+ 1.3	+ 3.9	+ 3.2	+ 3.5	+ 2.0	+ 3.9
Curry	3,261	3.65	109.3	+15.5	+23.8	+20.9	+18.3	+13.9	+ 5.5	+16.7	+13.7	+14.9	+ 8.5	+16.9
Douglas	30,742	25.05	79.5	+11.3	+17.3	+15.3	+13.4	+10.1	+ 4.0	+12.2	+10.0	+10.9	+ 6.2	+12.3
Jackson	46,413	15.67	33.0	+ 4.7	+ 7.2	+ 6.3	+ 5.5	+ 4.2	+ 1.7	+ 5.0	+ 4.1	+ 4.5	+ 2.6	+ 5.1
Josephine	18,723	12.08	63.0	+ 9.0	+13.7	+12.1	+10.6	+ 8.0	+ 3.2	+ 9.6	+ 7.9	+ 8.6	+ 4.9	+ 9.8
Klamath	19,457	2.34	11.7	+ 1.7	+ 2.6	+ 2.3	+ 2.0	+ 1.5	+ 0.6	+ 1.8	+ 1.5	+ 1.6	+ 0.9	+ 1.8
Lane	128,887	15.27	11.6	+ 1.6	+ 2.5	+ 2.2	+ 1.9	+ 1.5	+ 0.6	+ 1.8	+ 1.5	+ 1.6	+ 0.9	+ 1.8
Lincoln	21,438	.36	1.6	+ 0.2	+ 0.4	+ 0.3	+ 0.3	+ 0.2	+ 0.1	+ 0.3	+ 0.2	+ 0.2	+ 0.1	+ 0.3
Linn	36,465	2.64	7.1	+ 1.0	+ 1.5	+ 1.4	+ 1.2	+ 0.9	+ 0.4	+ 1.1	+ 0.9	+ 1.0	+ 0.6	+ 1.1
Marion	81,858	1.46	1.7	+ 0.2	+ 0.4	+ 0.3	+ 0.3	+ 0.2	+ 0.1	+ 0.3	+ 0.2	+ 0.2	+ 0.1	+ 0.3
Multnomah	289,074	1.09	0.4	+ 0.1	+ 0.1	+ 0.1	+ 0.1	*	*	+ 0.1	*	+ 0.1	*	+ 0.1
Polk	17,345	2.16	12.2	+ 1.7	+ 2.6	+ 2.3	+ 2.0	+ 1.6	+ 0.6	+ 1.9	+ 1.5	+ 1.7	+ 0.9	+ 1.9
Tillamook	6,264	.56	8.7	+ 1.2	+ 1.9	+ 1.7	+ 1.5	+ 1.1	+ 0.4	+ 1.3	+ 1.1	+ 1.2	+ 0.7	+ 1.4
Washington	124,592	.63	0.5	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	*	+ 0.1	+ 0.1	+ 0.1	*	+ 0.1
Yamhill	23,271	.72	3.0	+ 0.4	+ 0.7	+ 0.6	+ 0.5	+ 0.4	+ 0.2	+ 0.5	+ 0.4	+ 0.4	+ 0.2	+ 0.5

1/ The existing condition is the actual O&C distribution in fiscal 1980 as a percent supplement to 1980-81 property tax levies.
2/ The impacts in this table are calculated as the changes in local revenues (as a percent of 1980-81 levies) which would occur under each alternative cut level (valued at the fiscal 1980 average sales value for the WSSYUs).

* Change less than 1/10 of 1 percent.

Table 3-21 Short-Term Impacts Compared to No Action Condition on O&C Revenue Distribution
(Percent supplement to 1980-1981 total levies)

County	1980-81 Total Levies ($1000)	% Share O&C Payment	Change from No Action Condition 1/										Alt. 10 No Action Condition 2/
			Proposed Action	Alt. 1 Max. Tbr.	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb	Alt. 9 No ACE	
Benton	26,018	2.81	-0.1	+0.7	+0.4	+0.1	-0.3	-1.1	- *	-0.3	-0.2	-0.8	18.0
Clackamas	117,365	5.55	-0.1	+0.3	+0.2	+0.1	-0.1	-0.5	- *	-0.1	-0.1	-0.4	7.9
Columbia	17,218	2.06	-0.1	+0.7	+0.4	+0.1	-0.3	-1.2	- *	-0.3	-0.2	-0.9	19.9
Coos	22,794	5.90	-0.3	+1.6	+0.9	+0.3	-0.7	-2.6	- *	-0.7	-0.5	-1.9	43.1
Curry	3,261	3.65	-1.4	+6.8	+4.0	+1.4	-3.0	-11.4	-0.2	-3.2	-2.0	-8.4	186.4
Douglas	30,742	25.05	-1.0	+5.0	+2.9	+1.0	-2.2	-8.3	-0.1	-2.3	-1.5	-6.1	135.7
Jackson	46,413	15.67	-0.4	+2.1	+1.2	+0.4	-0.9	-3.4	-0.1	-1.0	-0.6	-2.5	56.2
Josephine	18,723	12.08	-0.8	+3.9	+2.3	+0.8	-1.7	-6.6	-0.1	-1.8	-1.2	-4.9	107.5
Klamath	19,457	2.34	-0.2	+0.7	+0.4	+0.2	-0.3	-1.2	- *	-0.3	-0.2	-0.9	20.0
Lane	128,887	15.27	-0.1	+0.7	+0.4	+0.1	-0.3	-1.2	- *	-0.3	-0.2	-0.9	19.7
Lincoln	21,438	.36	- *	+0.1	+0.1	+ *	- *	-0.2	- *	- *	- *	-0.1	2.8
Linn	36,465	2.64	-0.1	+0.4	+0.3	+0.1	-0.2	-0.7	- *	-0.2	-0.1	-0.5	12.1
Marion	81,858	1.46	- *	+0.1	+0.1	+ *	- *	-0.2	- *	-0.1	- *	-0.1	3.0
Multnomah	289,074	1.09	- *	+ *	+ *	+ *	- *	- *	- *	- *	- *	- *	0.6
Polk	17,345	2.16	-0.2	+0.8	+0.4	+0.2	-0.3	-1.3	- *	-0.4	-0.2	-0.9	20.7
Tillamook	6,264	.56	-0.1	+0.5	+0.3	+0.1	-0.2	-0.9	- *	-0.3	-0.2	-0.7	14.9
washington	124,592	.63	- *	+ *	+ *	+ *	- *	-0.1	- *	- *	- *	- *	0.8
Yamhill	23,271	.72	- *	+0.2	+0.1	+ *	-0.1	-0.3	- *	-0.1	-0.1	-0.2	5.2

1/ The impacts in this table are calculated on the basis of 1980 (fiscal year) timber sales rather than collections which are abnormally low because purchasers are postponing harvest. FY 1980 sales exceeded collections about 71 percent.

2/ The no action condition represents the total O&C distribution as a percentage of total levies in the county

* Change less than 1/10 of 1 percent.

increase. Lower timber industry employment due to reduced private timber supplies would make the impacts larger in relation to the timber industry.

Economic activity related to fisheries would increase under the proposed action and Alternatives 3 through 9. Income and employment related to elk hunting activity may increase under the proposed action and Alternatives 4 through 9 over amounts generated by the No Action alternative. Economic effects related to fisheries, hunting and recreation under Alternatives 1 and 2 would not differ from the effects of the No Action alternative.

Cumulative Economic Impacts

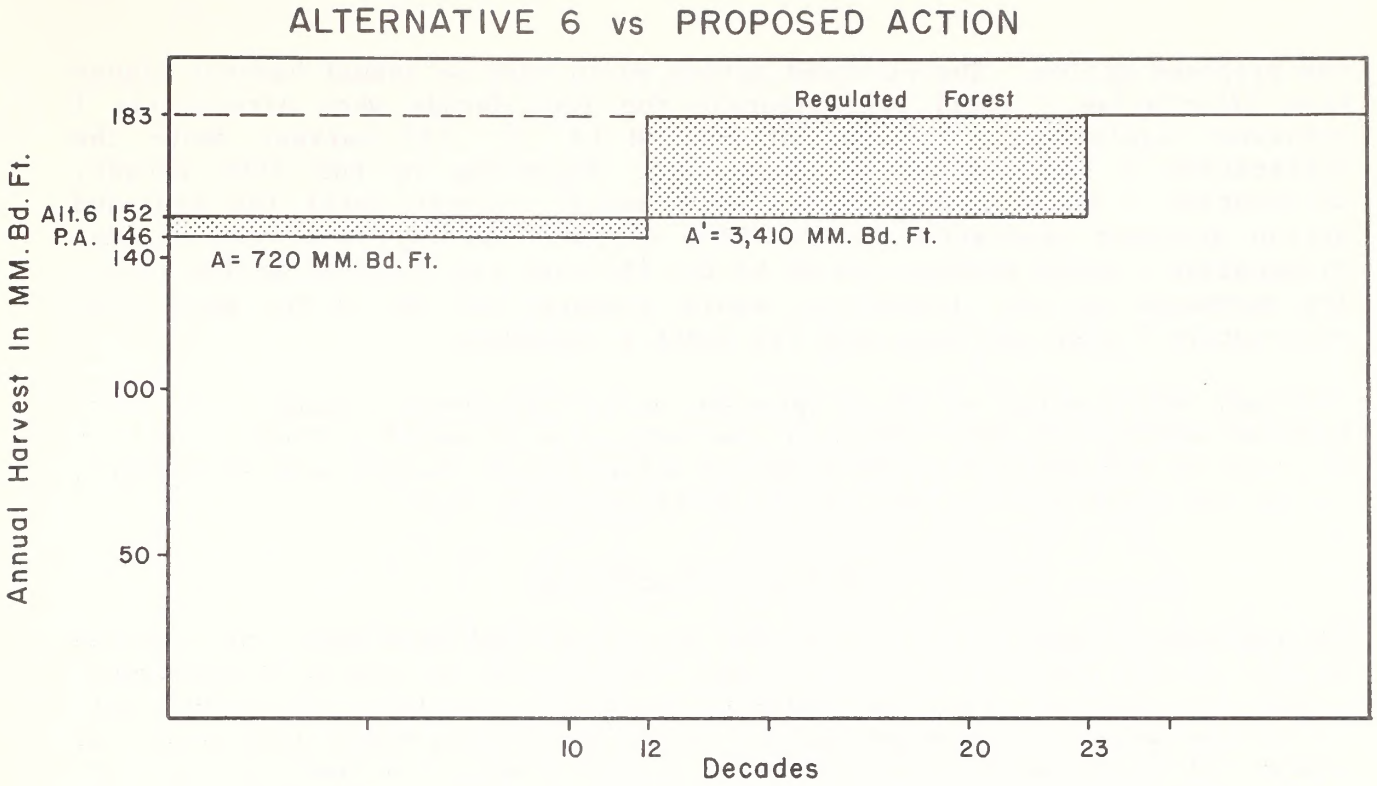
The cumulative impacts resulting from the alternatives for the WSSYUs in combination with the adoption of new timber management plans announced for the Josephine, Jackson and Klamath Sustained Yield Units of BLM's Medford District have been examined compared only to the No Action alternative. These impacts would be additive, that is, they would be the sum of the impacts of the individual actions.

The Medford District's new plans will reduce total O&C revenues and distributions by about 2.8 percent in the short term. This amounts to about $9 million where considered in terms of current timber sale values. The cumulative impact with the proposed action would amount to a 3.6 percent less revenue or around $12 million. This difference would be equivalent to an average of 22 cents per $1,000 of assessed value and 0.5 percent of total levies for all O&C counties. The most severe cumulative impact would be a 8.9 percent less O&C revenues if Alternative 5 were adopted. The cumulative impact of Alternative 1 together with the planned changes in Medford District would be an increase of 0.9 percent higher O&C revenues.

Comparison of Alternatives 6 and 7 to the proposed action discloses a trade-off between short-term use and long-term productivity.

Over the short-term (the first ten years), Alternative 6 would allow harvest of 60 MM bd.ft. (6 MM bd.ft./year) above that of the proposed action. However, over the long-term total productivity would be sacrificed. Maximum growth and yield are attained when a regulated forest is achieved (producing an estimated annual harvest of 183 MM bd. ft. - see page 1-9). As illustrated in Figure 3-3, Alternative 6 would have an annual harvest higher than the proposed action until approximately the 12th decade when the proposed action achieves regulation. During this time, a total of 720 MM bd.ft. (A) harvest above the proposed action level would be realized. Beginning in the 12th decade, the proposed action would produce the higher annual harvest (at the regulation level) until Alternative 6 achieves regulation in the 23rd decade. During those 11 decades, the proposed action would produce an additional 3,410 MM bd.ft. (B) for harvest. Therefore over the long term (at least 23 decades into the future), the proposed action would produce 2,690 MM bd.ft. more than Alternative 6.

When comparing Alternative 7 to the proposed action, the proposed action would produce 90 MM bd.ft. (9 MM bd.ft/year) more volume during the short-term. Over the long-term, total productivity would be enhanced under



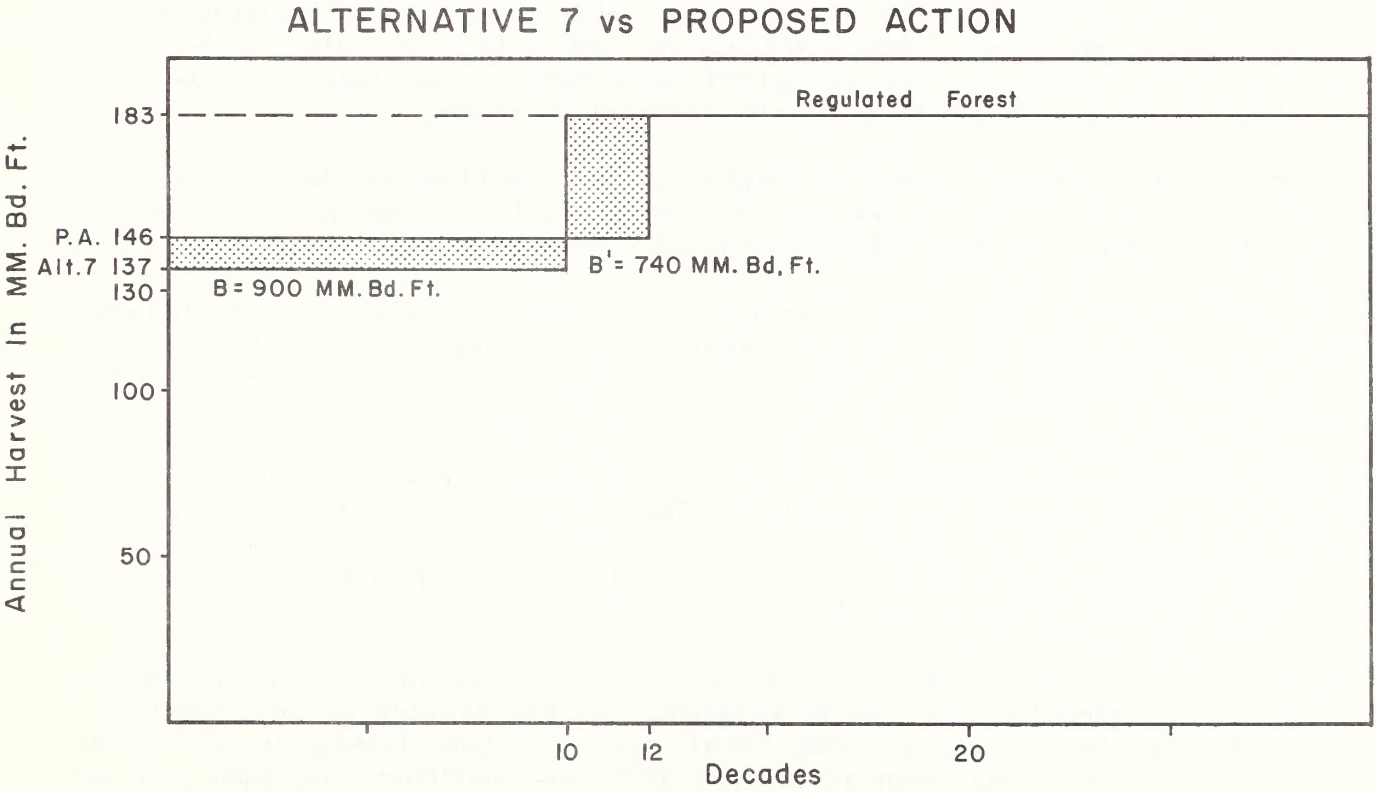


FIGURE 3-3

COMPARISON OF MINIMUM HARVEST SIZES

the proposed action. The proposed action would have an annual harvest higher than Alternative 7 until approximately the 10th decade when Alternative 7 achieves regulation. A total of 900 MM bd. ft. (B) harvest above the Alternative 7 level would be realized. Beginning in the 10th decade, Alternative 7 would produce the higher annual harvest until the proposed action achieves regulation in the 12th decade. During those two decades Alternative 7 would produce 740 MM bd.ft. (B) over the proposed action level. The proposed action, therefore, would produce 160 MM bd.ft. more than Alternative 7 over the long term (at least 12 decades).

Although Alternative 6 would provide more employment income and local revenues during the short term, in the long term it would provide less. In the case of Alternative 7, the proposed action would provide more employment, income and local revenues during the short and long term.

Other Social Impacts

The employment impacts in terms of the no action condition under the proposed action and Alternatives 4, 5, 7, 8 and 9 would cause a slowing of employment growth in recovery from an industry slowdown; however, if timber sale reductions were made when production was high, workers might lose jobs. If timber job losses were associated with a mill closure, workers in the core work force would be unemployed. Older workers might not be able to obtain new jobs. The personal losses would be great for these individuals deprived of their functional relationship to the society.

The perceived effects on economic welfare are a major social concern heightened by currently high unemployment rates. Any action causing a loss of employment would be viewed adversely by some public sectors. Under these circumstances, concern over perceived employment reductions is likely to dominate local public reaction to the alternative plans.

According to a survey cited in Chapter 2, more Willamette Valley residents favor increased wildlife habitat and more hiking, camping, hunting and fishing opportunities than favor increased timber production.

The use of herbicides would continue to be controversial due to concerns about ecosystem damage or health damage on the part of some residents as opposed to the concerns of other residents for economic benefits in timber production.

Underlying conflict between people with personal economic concerns and those with other concerns may be increased. The impacts of specific treatments on personal and community concerns would depend in part on the locations of treatment application and the manner in which BLM communicates and negotiates its actions with affected residents.

Local residents would be affected by their perception of the degree of control they exercise over local affairs. In the absence of full knowledge and understanding of plans, some local residents are likely to feel that their concerns have not been adequately addressed and that they have reduced control over local affairs.

APPENDICES

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

Comments on the draft environmental statement were requested from the following:

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
- Forest Service
- Soil Conservation Service

Department of Commerce
- National Marine Fisheries Service

Department of Defense
- U.S. Army Corps of Engineers

Department of Energy
- Region X

Department of the Interior
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Mines
- Water and Power Resources Service

Small Business Administration
Environmental Protection Agency

State and Local Government

Oregon State Clearinghouse
Oregon Regional Clearinghouses
- Lane Council of Governments
- Clatsop-Tillamook Inter-governmental Council
- Metropolitan Service District
- Mid-Willamette Valley Council of Governments
- District 4 Council of Governments

Oregon State Historic Preservation Officer
Boards of County Commissioners
- Benton County
- Columbia County
- Lincoln County
- Polk County
- Tillamook County
- Washington County
- Yamhill County
- Clatsop County
- Multnomah County
- Lane County

Interest Groups (partial listing)

American Forest Institute
Associated Oregon Industries
Association of O&C Counties
Cascade Holistic Economic Consultants
Friends of the Earth
Industrial Forestry Association
Izaak Walton League
Natural Resource Defense Council
National Wildlife Federation
Northwest Environmental Defense Center
Northwest Timber Association
Oregon Environmental Council
Oregon Natural Heritage Program
Oregon Student Public Interest Research Group
Oregon Wilderness Coalition
Sierra Club
Southern Oregon Citizens Against Toxic Sprays
Southern Oregon Resource Alliance
Southern Oregon Timber Industries Association
The Wilderness Society
Western Forest Industries Association
Wildlife Management Institute

Copies of this draft environmental impact statement will be available for public inspection at the following BLM offices:

Washington Office of Public Affairs
18th and C Streets
Washington, D.C. 20240
Phone (202) 343-5717

Salem District Office
1717 Fabry Road S.E.
Salem, Oregon 97302
Phone (503) 399-5646

Oregon State Public Affairs Office
729 N.E. Oregon Street
P.O. Box 2965
Portland, Oregon 97208
Phone (503) 231-6277

Reading copies will be placed in the following libraries: Portland State University, Portand; Oregon State University, Corvallis; University of Oregon, Eugene; Chemeketa Community College, Salem; Clatsop Community College, Astoria; and Linn-Benton Community College, Albany.

Public hearings will be held in Salem, Oregon, on the adequacy, completeness, and accuracy of this environmental impact statement. The hearings will not address the advantages or disadvantages of the proposed action, but opinions are and will be solicited on the quality of the analysis.

Details of the hearing will be published in the Federal Register and local news sources.

LIST OF PREPARERS

While individuals have primary responsibility for preparing sections of an EIS, the document is an interdisciplinary team effort. In addition, internal review of the document occurs throughout preparation. Specialists at the District, State Office and Washington Office levels of the Bureau both review the analysis and supply information. Contributions by individual preparers may be subject to revision by other BLM specialists and by management during the internal review process.

Name	Primary Responsibility	Discipline	Related Professional Experience
Dick Bonn	Team Leader	Biologist	3 years BLM (Environmental Specialist) Portland, Oreg. 11 years SCS 2-1/2 years (Biologist) Watershed & River basin, Columbus, Ohio. 2-1/2 years (Biologist) Watersheds Richmond, VA. 4 years (Biologist & Recreation) Albany, Oreg. 2 years (Soil Conservationist) Harrisburg, Oreg.
John T. Booth	Socioeconomics	Economics	22 years (Economist) 2-1/2 years (Regional Economist) BLM 7-1/2 years (Regional Economist) Corps of Engineers 2-1/2 years (Economist) Federal Reserve Bank of San Francisco 6-1/2 years (Economic Analyst) Wash. Dept. of Commerce 3 years (Tax Analyst) Wash. Tax Commission
D. F. Buck, Jr.	Soils, Air, Water, Climate, Geology, Human Health	Soil Scientist	4 years BLM (Soil Scientist, Environmental Protection Specialist)
L.D. Hamilton	Technical Coordinator/Editor	Geography	10 years (Outdoor Recreation Planner, Environmental Protection Specialist)
Phillip D. Havens	Fisheries & Wildlife	Wildlife Biology	17 years (Wildlife Biologist)
Jeanne Johnson	Editorial Assistant	Administrative Secretary	5 years BLM (Secretary, Editorial Assistant)
Joseph Ross	Recreation, Cultural Resources, Wilderness, Areas of Critical Environmental concern, Special Areas, Visual Resources and Energy.	Recreation	6 years (Forestry Technician, Biological Information Specialist, Outdoor Recreation Planner)
R. Gregg Simmons	Description of the Proposed Action and Alternatives, Vegetation	Forest Management	6 years BLM (Forester) 5 years Eugene, Oreg. 1 year Portland, Oreg.

APPENDICES

A Development of the Proposed Action

B The Scoping Process

C Ecosystem Management

D Wildlife

E Predicted Alteration of Wildlife Habitat on all Forest Lands in N.W. Oregon

F Alteration of Wildlife Habitat on BLM-Administered Forest Land

G Estimation of Employment in Forest Management

Appendix G Estimation of Employment in Forest Management 1/

Treatment	Worker Days Per Acre	Number of Acres Treated in First Decade										
		Proposed Action	Alt. 1 Max. Tbr	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt. 10 No Action
Site Preparation 2/												
Herbicide 3/	.025	5,400	6,572	6,104	5,883	4,838	3,447	5,400	5,400	0	5,400	5,400 4/
Mechanical	1.000	4,300	4,960	4,300	4,300	3,866	2,970	4,300	4,300	4,300	4,300	4,300 4/
Stand conversion	1.667	1,010	770	1,220	1,220	1,090	640	1,010	1,010	1,010	1,010	1,500
Planting:												
Initial	.667	22,105	29,385	25,812	23,846	20,817	15,045	22,863	20,728	21,659	16,867	22,710
Replanting	.667	8,400	11,166	9,809	9,061	7,911	5,718	8,688	7,877	8,230	6,409	8,630
Plantation protection	.500	9,590	10,470	9,590	9,590	8,699	6,391	9,590	9,590	9,590	9,590	9,590 4/
Mtnc. and release:												
Herbicide	.025	13,000	15,582	14,625	13,466	11,652	8,330	13,000	11,726	-	9,421	13,100 4/
Manual	1.667	-	-	-	-	-	-	-	-	3,370	-	-
Precommercial thinning	.667	3,581	3,905	3,698	3,559	3,188	3,163	3,581	3,581	3,581	3,581	3,581 4/
Fertilization	.025	4,280	4,669	4,490	4,293	3,615	3,305	4,280	4,280	4,280	4,280	4,280 4/
Total worker-days 5/		34,516	42,236	38,420	36,478	32,258	24,003	35,214	33,217	38,828	29,605	35,892
Total jobs 6/		14	17	15	15	13	10	14	13	16	12	14

1/ Employment net of timber harvest employment (logging and associated road construction and slash burning) calculated by multiplying estimates of worker-days/acre times treatment acreages.

2/ Broadcast burning acreage is omitted from the estimation of employment on the assumption that most of the clearcut burning is now performed by loggers harvesting timber and thus is already accounted for.

3/ For each alternative except Alternative 8, it is estimated that 450 man-days per decade would be required to perform cut stump treatment on 600 acres of the acreage shown instead of aerial treatment.

4/ Assumed for purpose of employment calculations only.

5/ Sum of products of acres treated times worker-days per acre.

6/ Worker-days for decade converted to average annual number of jobs on basis of 250 work days per year. Jobs in each county estimated in proportion to historical distribution of WSSYUs harvest (Table 2-17).

Appendix A

DEVELOPMENT OF THE PROPOSED ACTION

Defining the proposed action is the last phase of the planning process prior to preparation of the EIS. Alternatives to the proposed action are identified during the scoping phase of the environmental analysis process. Each alternative analyzed in this EIS contains a mix of variables encompassing a range of choices for decisionmakers as required by the CEQ Regulations (40 CFR 1502.2 (2)).

In determination of a sustained yield allowable cut, the primary variables are land classification, acres allocated to timber production and enhancement of growth assumed from specific development practices or treatments. Following in the order of occurrence are brief descriptions of the inventories and processes employed to determine the allowable cut level for the proposed action and each alternative.

Land Classification and Inventory

Timber Production Capability Classification

The Timber Production Capability Classification (TPCC) is an intensive inventory process initiated in 1972 to categorize all public land administered by BLM in western Oregon based upon the land's physical and biological capacity to produce timber. TPCC was conducted in accordance with Oregon Manual Supplement 5250.

The TPCC identifies commercial forest land which could be managed on a sustained yield basis. These lands consisting of conifers and hardwoods formed the potential timber production base for computation of the annual allowable harvest. Approximately 194,500 acres of conifers and 9,000 acres of manageable hardwoods were identified in this category. The TPCC also identified about 9,500 acres of commercial forest land that was determined to be uncapable of undergoing harvest without significant site degradation. Lands excluded from the timber production base were placed in this category when it was judged that economically reasonable technology was not available to mitigate such degradation. The remainder of the SYUs' 244,000 acres was determined to be unmanageable hardwoods, non-forest or non-commercial forest. If new data become available from intensive on-site analysis or improvements occur in technology, the classifications may be altered.

Operations Inventory

For BLM to carry out the timber management program effectively, specific information as to the location and current condition of the various forest types within the land base must be available to the managers. This is accomplished through the Operations Inventory (OI) in accordance with procedures contained in the Operations Inventory Handbook (STORMS).

The OI is an intensive inventory providing forest type maps which show the location and classification of each homogeneous forest type island. OI record cards list acreage, silvicultural needs and opportunities for application of forest management practices on each type island. Operations Inventory thus provides a basis for establishing priorities for treatment based on stand conditions and productivity.

1978 Forest Reinventory

A reinventory of commercial forest land in the WSSYUs was completed in 1978 employing procedures for extensive inventory jointly developed by the USFS and BLM (USDA, FS 1976). The reinventory uses the same basic inventory design as was used for determination of the present allowable cut, but with further refinement to include stratification of commercial forest land based on information obtained from the OI and TPCC. Statistical analysis indicates the sample mean volume per acre in the WSSYUs is within 7 percent of the true mean volume per acre at one standard deviation.

The reinventory indicates a forest distribution as displayed in Table A-1. Age classes range from non-stocked, where reproduction has not been established, to 400 years.

Table A-1 Existing Acres by Age Class on All Timber Management Lands

Age Class	Acres	Age Class	Acres
Non-stocked	11,543	170	519
1-5	13,693		
10	25,590	190	1,392
20	12,285		
30	38,334	210	456
40	25,580	220	912
50	11,627		
60	8,388	250	203
70	12,263		
80	14,964	280	456
90	18,931	300	932
100	11,697		
110	3,813	350	1,814
120	5,045		
130	4,564	400	912
140	444		
150	1,296	Total	227,653

Other Resource Inventories

Inventories were conducted to identify and categorize specific capability and potential of resources other than timber. Recreation planners applied the BLM's Recreation Information System, an inventory approach for determining inherent potential of the land to support various recreation activities. Visual resource specialists inventoried and classified the WSSYUs for visual and esthetic considerations. A review and compilation of known cultural resource data (Class I cultural resource inventory) has been completed. Wildlife biologists inventoried deer and elk winter range and northern spotted owl and bald eagle nest sites. Fisheries biologists conducted surveys of streams within the district. Botanical surveys for threatened and endangered plants were initiated for the Salem District in September 1978 and are updated yearly.

Land Use Allocation

During the development of the proposed land use allocations, broad land use alternatives (MFP Alternatives) were identified and reviewed by the District to assess their effects. These MFP alternatives were circulated for public review and comment in 1980. Scoping (see Appendix B) of the EIS led to the conclusion that four of these land use allocation alternatives (some slightly modified) were important enough to analyze in depth. The resulting land use allocations by alternative (Table A-2) were adapted from those alternatives.

When final MFP timber management decisions are made, they will form the management prescriptions. Similarily, actions for other resources, e.g., habitat management plans, will be within the MFP guidelines.

Allowable Cut Computation

Forest Simulation Model

A computerized forest simulation model (SIMIX) is used to determine the highest sustainable allowable cut for each alternative. SIMIX calculates the allowable cut associated with the stated forest management plan. It can maximize an even-flow level of cut for some specific management regime, or a series of cut levels may be specified for as many as the first 10 decades followed by an even-flow level for the remainder of the projected period (40 decades). This lengthy projection period is not an attempt at a 400 year plan. It is used only to assure that the condition of no planned reduction in allowable cut can be met.

The clearcut option of SIMIX was utilized since clearcut is the predominant harvest method in all alternatives. For accuracy in measuring lumber and plywood production, the allowable cut is computed and projected into the future on the basis of cubic feet.

Table A-2 Land Use Allocation Proposed for the EIS Alternatives
Including the Proposed Action In Acres

	Alternatives Including the Proposed Action (PA)						
	PA, 6,7,8&9	1	2	3	4	5	10 1/
No Planned Timber Harvest							
Non-Forest Lands	16,131	15,932	16,146	16,155	16,156	16,156	11,665
Fragile Site Withdrawals	7,540	0	7,540	7,540	7,540	7,540	3,640
Reforestation Withdrawals	1,271	0	1,256	1,247	1,286	1,526	0
MFP Withdrawals 2/	29,732	537	462	14,370	22,735	69,550	1,708
Hardwood Lands	9,472	0	13,542	11,405	11,612	7,983	18,758
Scattered Tracts	215	215	215	215	215	215	0
Sub-total	64,361	16,684	39,161	50,932	59,544	102,970	35,771
Planned Timber Harvest							
Intensive Base							
Conifer	166,968	203,068	193,927	179,812	154,250	131,982	206,788
Hardwoods	9,240	23,537	9,751	9,495	9,455	8,467	0
Constrained Base							
VRM II	2,480	0	0	2,600	2,560	0	0
Wildlife	0	0	0	0	17,160	0	0
Other 3/							
Stand Conversion	1,010	770	1,220	1,220	1,090	640	1,500
Sub-total	179,698	227,375	204,898	193,127	184,515	141,089	208,228
Total WSSYUs Acres	244,059	244,059	244,059	244,059	244,059	244,059	244,059

1/ The land use allocations for this alternative (10) result from the land classification and inventory programs used in the 1970 planning process.

2/ These are commercial forest lands withdrawn from the timber production base for other resource considerations. See the District's Management Framework Plan (MFP) for the identified resource and acres allocated.

3/ These other lands are unmerchantable hardwoods and brush fields that are included in the allowable cut computation after conversion to coniferous plantations.

SIMIX computes the harvest level based on present inventory and projected growth resulting from the application of certain management practices (mortality salvage, precommercial and commercial thinning, commercial thinning only, forest genetics and final harvest cuts). Another treatment, fertilization, is included in conjunction with one or more of the above treatments. SIMIX must be told what treatments, when and the number of acres, to be treated. No rotation age is set, instead, a minimum cutting age constraint is specified. SIMIX is not designed to handle economic values or costs, and it does not seek out alternative schedules or strategies.

The model, designed for forests under an even-aged system of management, produces output data by decades for each age and treatment class and summarizes them numerically and graphically. These data include level of growing stock, annual growth, acreage by silvicultural practices and volume by harvesting practice. Consequently, it permits alternative plans to be evaluated on the basis of their respective production levels and fiscal requirements and serves as a basis for programming personnel and funds for the alternative selected. In effect, a management plan is developed that schedules the production from commercial thinning, mortality salvage and final harvest operations and also the acreages for such treatments as reforestation and precommercial thinning. The model is geared to the proposed policies but is flexible to the extent that other regulatory policies can be applied in its use.

The Allowable Cut Effect (ACE)

A forest that is composed primarily of old-growth timber and recently cut-over stands exhibits a relatively low average annual growth. This results from slow or negative growth of the old stands and the fact that growth is not measurable (in end-product terms) in the young stands until they reach 20 or 30 years of age. Such a forest is in transition from an unmanaged to a managed or regulated state. In the classical sense, the regulated state is achieved when average annual harvest and growth are in equalibrium. At this point, maximum yield on a sustainable basis is reached. To compute an allowable cut on a forest in the transition state using this criteria would be extremely conservative and greatly lengthen the time until the regulated state was achieved. The BLM uses an alternative approach which is to project growth into the future based upon assumptions about management levels and to utilize excess harvest age timber to bridge the time gap until the ultimate growth level is achieved. This process of taking credit now for future growth increases expected to result from management has been termed the "Allowable Cut Effect" (ACE).

Figure A-1 illustrates this process in the context of conditions found in the WSSYUs, before land use allocaations were made to other resource activities.

This forest is in the early to middle transition stage and, as the recent inventory found, has a relatively low average annual growth rate. An initial computation was made that assumed no intensive management practices were performed. Under this scheme, stands were projected to grow in a fashion similar to normal unmanaged forests. The lower growth curve in Figure A-1

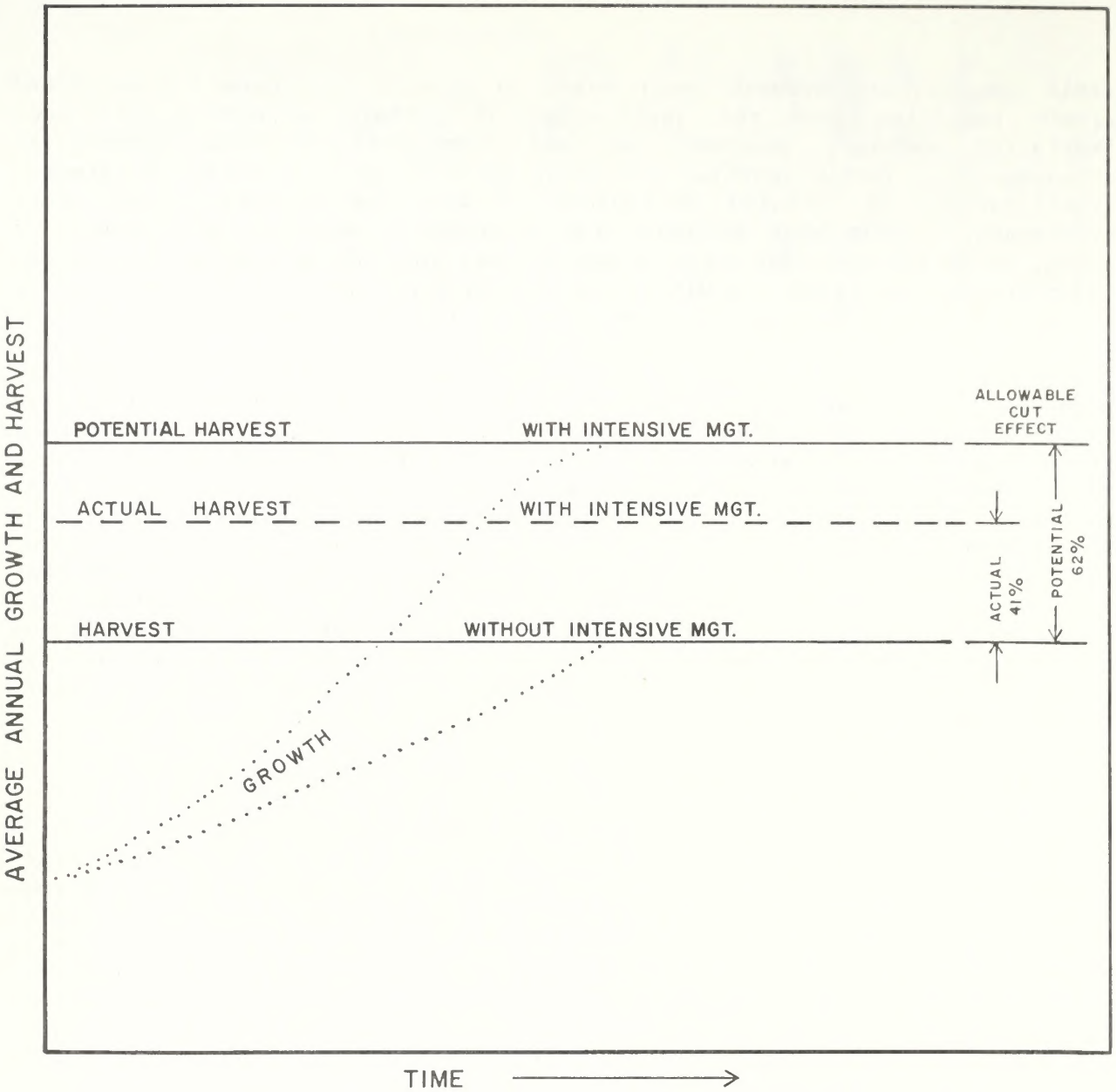


FIGURE A-1
ALLOWABLE CUT EFFECT

shows the average annual growth path projected from these assumptions. When tested on the allowable cut model, it was determined that sufficient harvest age timber was available to bridge the gap until a regulated state was achieved.

Next, a high level of management was assumed. Practices (see Chapter 1, Forest Management Treatments and Design Elements) such as genetic improvement, precommercial and commercial thinning, stand conversion, fertilization and mortality salvage were used in projecting yield functions. The basis for most of these projections was the DFIT model. The higher growth curve in Figure A-1 shows the average annual growth path resulting from the intensive management assumptions. When tested on the allowable cut model, it was determined that there was only enough harvest age timber available to take credit for a portion of the expected future growth increases. For full ACE credit to apply, there must be enough harvestable timber to bridge the previously mentioned time gap. Since this was not the case in the WSSYUs, the allowable cut effect applied was limited to about 66 percent of the projected potential allowable cut effect. To set a cut level higher than the "actual" would cause a drop in future cut levels, a violation of Bureau policy. Essentially, the limited volume of standing harvest age timber has built a conservative factor into the computation process.

Appendix B
The Scoping Process

A public meeting was held in Salem on October 28, 1980 for the purpose of scoping the Westside Salem Timber Management Environmental Impact Statement. Scoping, required by CEQ (40 CFR Part 1501.7), is the process by which significant issues relating to a proposed action are identified for environmental analysis. In addition, alternatives to a proposed action are also identified.

Comments received at that meeting suggested that the EIS address eight land use allocation alternatives, in addition to the preferred alternative and the required No Action (continuation of existing plan) alternative.

The eight land use allocation alternatives suggested were:

A. Spacing Management by Watersheds. Management to maintain or attain uniform timber age class distribution on each watershed unit (averaging perhaps 640 acres).

B. Strong Emphasis on Preservation of Wildlife Habitat Diversity and Protection of Other Non-Timber Values. The primary amenity allocation would be for management of 73,000 acres on 200-year and 350-year timber harvest cycles, to maintain wildlife habitat diversity. Substantial allocations for recreation lands, natural areas, riparian zone buffers and protection of visual values would also be included.

C. Strong Emphasis on Preservation of Wildlife Habitat Diversity, (Including Retention of All Existing Old Growth) and on Protection of Other Non-Timber Values. In addition to the amenity allocations of B above, all other old-growth timber stands would be excluded from harvest. Some 16,000 acres of old-growth stands would be retained, 3,000 acres more than in Alternative B.

D. Emphasis on Wildlife Habitat Diversity and Other Amenity Values Consistent with Substantial Timber Harvests. The primary amenity allocation would be for management of 34,400 acres of old-growth conifer and replacement habitat on a 350-year timber harvest cycle, in designated corridors. Protection of other amenity values would be similar to the preferred alternative.

E. Emphasis on Timber Production Consistent with Protection of Some Other Values. The amenity allocations of this alternative would include 3,660 acres specifically for wildlife (spotted owls and one bald eagle pair) and a much lesser allocation for recreation lands than in the preferred alternative. Natural area, riparian zone buffer and visual resource allocations would be similar to the preferred alternative.

F. Strong Emphasis on Timber Production. The primary amenity allocations, from lands considered to be promptly reforestable if the timber is cut, would be a buffer for a bald eagle nest, preservation of designated

outstanding and research natural areas, and retention of existing recreation sites. Riparian zone buffers could be included.

G. 1972 Land Base with Preferred Alternative Practices. The land-use allocations would be those on which the current allowable cut for the area was based.

H. Maximum Possible Timber Production. All commercial forest land (capable of growing 20 cu. ft. of timber per acre annually) would be subjected to intensive timber management regardless of how promptly BLM believes it could be reforested. The only allocations for amenity values would be for developed recreation sites and bald eagle habitat.

Comments also suggested that the EIS address six alternatives relating directly to the timber management program. The six alternatives are as follows:

a. No Use of Herbicides for Vegetation Management. No herbicides would be used to control grass, brush or hardwood species growing in competition with commercial coniferous tree species. Control of vegetation for timber management by using biological, mechanical or manual means would be permitted.

b. No Allowable Cut Effect. No credit would be taken, in the allowable cut assumptions, for increased timber growth expected from intensive management practices until gains in tree growth can be measured in future inventories.

c. Minimum Harvest Age of 50 Years. Compared to the preferred alternative, which is based on the assumption that conifer stands younger than 60 years would not be harvested in any decade, this alternative would anticipate harvest of 50-year old younger stands for a few decades during the projection period.

d. Minimum Harvest Age of 70 Years. The assumption would be made that no conifer stands younger than approximately 70 years would be harvested in any decade.

e. Depart From Even Flow. The intent of this alternative would be to fill the timber supply gap of the next several decades that has been identified in State studies. The harvest level over those supply-gap decades would be increased, to later be dropped below the current sustainable level for a time.

f. Anticipate that Allowable Cut Assumptions are Wrong by 20 Percent. This alternative could be treated in combination with any land use allocation. It would not call for an initial adjustment in the allowable cut but would analyze the subsequent consequences of the 20 percent errors in assumptions.

On October 29, 1980, the Salem District Multiple Use Advisory Council reviewed these suggested alternatives. To provide a reasonable range of alternatives, they recommended that land use Alternatives B, D, E, F and H and timber management Alternatives a, b, c and d be addressed in the EIS. They also recommended that Alternative F be modified to include streamside buffers (brush and non-merchantable hardwoods) but no other riparian zone protection from timber harvest.

Participants in the scoping meeting suggested that relevant alternatives which did not address land use allocations be treated as sub-alternatives and matched against all land use allocation alternatives. To devote substantial treatment to the indicated 28 different alternatives, as required by CEQ regulations, would have added substantially to the cost of EIS preparation and made the EIS more complex and difficult for the reader to understand. Consequently, it was concluded that this exceeded a reasonable array of alternatives. Therefore, the timber management related alternatives analyzed in the EIS will use the proposed land use allocation for comparative purposes by the decisionmaker and the public. Table B-1 presents a matrix of the land use alternatives and the timber management alternatives analyzed in the EIS in terms of annual allowable harvest.

Table B-1 The Effect of Timber Management Alternatives on Land Use Alternatives in Terms of Allowable Harvest (in MM bd. ft.)

Timber Management Alternatives		Land Use Alternatives				
	P.A.	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
MHA 50	155	190	179	168	145	N/A
MHA 60	149	N/A	176	163	141	N/A
MHA 70	140	N/A	167	157	136	99
No Herb.	146	187	172	160	138	97
No ACE	114	137	128	120	104	89

The EIS analyzes the following alternatives:

The Proposed Action (as defined at the scoping meeting)
Alternative 1 (equivalent to suggested Alternative H)
Alternative 2 (F)
Alternative 3 (E)
Alternative 4 (D)
Alternative 5 (B)
Alternative 6 (equivalent to Alternative c using proposed land use allocations)

Alternative 7 (d)
Alternative 8 (a)
Alternative 9 (b)
Alternative 10 (no action/no change)

The remaining alternatives suggested at the public scoping meeting were eliminated from consideration based on the need to limit the alternatives to a number that can be analyzed effectively and discussed clearly in the EIS. Specific reasons why BLM eliminated the following alternatives are:

A. It is not practical to analyze this alternative because BLM does not have a computer program (or the capability to soon develop and implement one) that could define the specifics of such area control. Without that capability, neither a related allowable timber harvest level or the environmental impacts that would be tied to harvest rates in the plan decade can be determined. In addition, the concept of this alternative seems weak, as BLM is a minority landowner in the planning area and cannot alone significantly influence water quality in most streams, given the assumption that under any alternative, best management practices will be applied.

C. The difference between this alternative and B is the retention of a few thousand additional acres of old-growth timber. With this modest distinction, it does not seem useful to address both, and the Advisory Council felt that Alternative B focused attention better on the issues. BLM agreed, but modified B to provide for retention of all existing old growth until replacement stands are created.

G. The land base allocated to intensive timber management under this alternative is only a few thousand acres less than the intensive management base in Alternative F that will be analyzed in the EIS, so it does not differ significantly enough from F to warrant separate analysis. Further, it would bear many similarities to the No Action (continuation of existing plan) alternative, since that alternative also is tied to the existing land allocation and the only significant preferred alternative practice added to current ones is fertilization.

e. BLM has tested, through an allowable cut run on the Preferred Alternative land base, the ability to harvest substantially more timber over several decades without a considerable subsequent harvest decline. The existing age class distribution does not permit it. BLM tested each EIS alternative (except alternatives 4,5 and 10) for surplus inventory which could be harvested in accordance with Deprtmental policy. However, no surplus inventory was found. Since the Forestry Program for Oregon shows a significantly smaller supply gap in the EIS area during the 1980's than during any subsequent decade, an alternative to increase harvest in the 1980's only to drop it below the non-declining sustained yield level later seems inappropriate.

f. Of all alternatives proposed at the public scoping meeting, and seriously considered by the attendees, this one received the least support. Since BLM timber management plans are updated every 10 years, and those updates will include adjustments of assumptions based on actual evidence, an analysis calculated on projection of erroneous assumptions several decades into the future would not be meaningful. Projecting a 20 percent error rate for only one decade, on the other hand, would not result in impacts significantly different from those that will be addressed in discussion of the primary alternatives.

Attendees at the public scoping meeting provided useful comments on issues that should be addressed in the EIS. They also indicated that a public hearing would provide additional opportunity for response to the draft EIS.

Appendix C
Ecosystem Management

This appendix contains a brief discussion of ecosystem management and its relationship to Alternatives 4 and 5. Other alternatives would not achieve the objectives of ecosystem management.

Ecosystem management is defined as managing for the interaction of natural systems consisting of both living and nonliving components that occur in a given area or region. Ecosystem management would be achieved through maintenance of maximum habitat diversity which, in turn, would provide for maximum diversity of wildlife species. In the forest environment, this means managing for all successional stages, each with unique horizontal and vertical structure, plus any special habitats such as dry meadows, wetlands, cliffs and riparian zones. Besides simply retaining these habitats, special efforts would be focused on maintaining proper stand conditions for wildlife. This would be accomplished because management activities such as mortality salvage and commercial thinning can adversely alter structure of the natural stand for wildlife.

Ecosystem management provides a comprehensive approach to the wildlife management of all 286 known species of terrestrial vertebrates in the SYUs. However, featured species, such as elk, deer and the northern spotted owl receive special emphasis within the comprehensive ecosystem approach.

In the following discussion of Alternatives 4 and 5, old-growth habitat is emphasized because of its relative scarcity in the planning area. However, all existing habitats would at least be partially retained under both alternatives.

Alternative 5

Old Growth

This alternative would maintain old growth by use of a 350-year harvest rotation scheme within a large block (1,920 acres) and small block (240 acres) pattern evenly distributed over BLM-administered lands in the Salem SYUs. Because of the limited amount of old growth remaining in the SYUs, interim protection would be extended to all old growth. Interim management of 350-year rotation blocks would proceed as follows: (1) maintain undisturbed conditions on oldest forest stands until 640 acres of contiguous old growth are available in large blocks and 80 acres in small blocks; (2) harvest younger (< 100 years-old) forest stages within the large and small blocks in order to help develop an even distribution of age classes to perpetuate long harvest rotations; and (3) after harvesting, reforest and allow natural stand development until next harvest. Once the desired level of old growth is attained within the blocks, old growth outside of the blocks would be harvested. Then, final management of the 350-year rotation blocks would be: (1) continue a harvesting schedule (initiated in interim phase) within designated blocks which would maintain the desired level of contiguous old growth; and (2) after harvesting, reforest and allow natural stand development until next harvest.

Mid-age

Management of the 200 year-old rotation blocks would proceed as follows: (1) maintain undisturbed conditions on the oldest stands until 640 acres of contiguous mid-aged conifer forest are available in large blocks and 80 acres in small blocks; (2) develop and initiate a harvesting schedule which would maintain the desired level of mid-aged conifer forest; and (3) after harvesting, reforest and allow natural stand development until next harvest.

Alternative 4

The same management techniques as Alternative 5 would be applied except that the distribution of blocks would be confined to a corridor ranging between 2 and 4 miles wide and only the 350-year rotation would be applied. Both private and public lands fall within the corridor. However, only selected BLM land would be retained for wildlife. The corridor would facilitate the gene flow of those species which find their optimum habitats in older seral stages. Corridors should prevent genetic isolation and maintain the current diversity of wildlife species dependent upon old growth forest.

The large block size of 1,920 acres was selected to achieve long harvest rotations with 640 acres as older forest and 1,280 acres as replacement stands. The core size of 640 acres was selected to provide habitat for secretive and/or wide-ranging species such as fisher and marten. An identical management scheme was utilized for the small blocks except that an area of 240 acres was selected to achieve long harvest rotations with 80 acres as older forest and 160 acres as replacement stands. Small blocks of older forest would be distributed at approximately 1 mile intervals and would provide minimum habitat for forest interior species. Ideally, from a wildlife perspective, older forest would total 15 percent of BLM land. However, due to consolidation of wildlife habitat areas with visual, natural and recreational areas (which would be substituted for proposed wildlife areas) the total allocation of older forest would be 9.6 percent with an additional 19.2 percent as replacement stands.

					Conifer Habitat				Other Habitat						
	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwoods	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes/Cliffs	Other
Mammals															
Virginia Opossum (Didelphis virginiana)	P	C	U	U	U	U	U	U	U	O	U	O	U		U
Vagrant Shrew (Sorex vagrans)	P	C	U	U	U	U	U	U	U	O	U	O		U	
Dusky Shrew (Sorex obscurus)	P	C	U	U	U	U	U	U	U	U	U			U	
Pacific Shrew (Sorex pacificus)	P	C	U	U	U	U	U	U	U	O	U	O			
Pacific Water Shrew (Sorex bendirii)	P	C	U	U	U	U	U	U	U	O	U	O		U	
Trowbridge's Shrew (Sorex trowbridgii)	P	C	U	U	U	U	U	U	U	O	U	O			
Shrew-mole (Neurotrichus gibbsii)	P	C	U	U	U	U	O	O	U	U	U			U	
Townsend's Mole (Scapanus townsendii)	P	C	U	U	U	U			U		O				
Coast Mole (Scapanus orarius)	P	C	U	U	U	U	O	O			U				
Little Brown Myotis (Myotis lucifugus)	P	C	U	U	U	U	O	O	U	U	U		U	U	
Yuma Myotis (Myotis yumanensis)	P	U					O	O	U	O		O	U	U	
Long-eared Myotis (Myotis evotis)	P	C	U	U	U	U	O	O	U	U	U		U	U	
Long-legged Myotis (Myotis volans)	P	C	U	U	U	U	O	O	U	U	U		U	U	
California Myotis (Myotis californicus)	P	C	U	U	U	U	O	O	U	U	U		U	U	
Silver-haired Bat (Lasionycteris noctivagans)	P	C	U	U	U	U	O	O	U	U	U	U		U	
Big Brown Bat (Eptesicus fuscus)	P	C	U	U	U	U	O	O	U	U	U		U	U	
Hoary Bat (Lasiurus cinereus)	P	C		U	U	U	O	O	U	U			U	U	
Townsend's Big-eared Bat (Plecotus townsendii)	P	C	U	U	U	U	U	U	U	U	U			U	
Brush Rabbit (Sylvilagus bachmani)	P		U	U	U				U	U	U				
Eastern Cottontail (Sylvilagus floridanus)	P	R	U	U					U	U	U				
Snowshoe Hare (Lepus americanus)	P		U	U	U	U	U	U	U	U	U				
Mountain Beaver (Aplodentia rufa)	P	C	U	U	U	U	U	U	U	U	U				
Townsend's Chipmunk (Eutamias townsendii)	P	C	U	U	U	U	U	U			U			U	
California Ground Squirrel (Spermophilus beecheyi)	P	C	U	U					U	U	U			U	
Western Gray Squirrel (Sciurus griseus)	P	R			U	U	U	U	O	U			U		
Douglas' Squirrel (Tamiasciurus douglasii)	P	C			U	U	O	O	U	U			O		
Northern Flying Squirrel (Glaucomys sabrinus)	P	C				U	O	O	U	U			O		
Western Pocket Gopher (Thomomys mazama)	P	C	U	U							U				
Camas Pocket Gopher (Thomomys bulbivorus)	P	U	U								U				
Beaver (Castor canadensis)	P	C	U	U	U	U	U	U	U	O	U	O			
Deer Mouse (Peromyscus maniculatus)	P	C	U	U	U	U	U	U	U	U	U		U	U	
Dusky-footed Woodrat (Neotoma fuscipes)	P	C	U	U	U	U	U	U	U	U	U				
Bushy-tailed Woodrat (Neotoma cinerea)	P	C	U	U	U	U	O	O	U	U	U		U	U	
Western Red-backed Vole (Clethrionomys occidentalis)	P	C	U	U	U	U	O	O			U			U	
White-footed Vole (Phenacomys albipes)	P	U	U	U	U	U	U	U	O	O	U	O	U		
Red Tree Vole (Phenacomys longicaudus)	P	C				U	O	O					U		
Montane Vole (Microtus montanus)	P	C	U	U					U	U	U				
Townsend's Vole (Microtus townsendii)	P	C	U	U	U				U	O	U	O			
Long-tailed Vole (Microtus longicaudus)	P	C	U	U	U				U	O	U	O		U	
Creeping Vole (Microtus oregoni)	P	C	U	U	U	U	U	U	U	U	U				

	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwoods	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes/Cliffs	Other
			Conifer Habitat							Other Habitat					
Muskrat (Ondatra zibethicus)	P	C	U							O	O				
Black Rat (Rattus rattus)	P	C													U
Norway Rat (Rattus norvegicus)	P	C													U
House Mouse (Mus musculus)	P	C													U
Pacific Jumping Mouse (Zapus trinotatus)	P	C	UY	U	U	U	U	U	O	U	O				
Porcupine (Erethizon dorsatum)	P	C	U	U	U	U	U	U	U	U	U			U	
Nutria (Myocaster coypus)	P	C								O		O			
Coyote (Canis latrans)	P	C	U	U	U	U	U	U	U	U	U			U	
Red Fox (Vulpes vulpes)	P	C	U	U	U	U	U	U	U	U	U				
Gray Fox (Urocyon cinereoargenteus)	P	C	U	U	U	U	U	U	U	U	U			U	
Black Bear (Ursus americanus)	P	C	U	U	U	U	O	O	U	U	U	U	U	U	
Raccoon (Procyon lotor)	P	C	U	U	U	U	U	U	U	O	U	O	U	U	
Marten (Martes americana)	P	R			U	U	O	O		U			U	U	
Fisher (Martes pennanti)	P	R	U	U	U	U	O	O		U	U		U	U	
Ermine (Mustela erminea)	P	CX	U	U	U	U	O	O	U	U	U	O	U	U	
Long-tailed Weasel (Mustela frenata)	P	C	U	U	U	U	U	U	U	U	U	U	U	U	
Mink (Mustela vison)	P	C	U	U	U	U	U	U	U	O	U	O			
Western Spotted Skunk (Spilogale gracilis)	P	C	U	U	U		O	O	U		U				
Striped Skunk (Mephitis mephitis)	P	C	U	U	U				U	U	U			U	
River Otter (Lutra canadensis)	P	U								O		O			
Mountain Lion (Felis concolor)	P	U	U	U	U	U	O	O	U	U	U			O	
Bobcat (Felis rufus)	P	C	U	U	U	U	O	O	U	U	U	U		O	
Roosevelt Elk (Cervus elaphus rooseveltii)	P	C	U	U	U	U	O	O	U	O	O	U			
Columbian Black-tailed Deer (Odocoileus hemionus columbianus)	P	C	O	O	U	U	O	O	U	U	U	U			
Columbian White-tailed Deer (Odocoileus virginians leucurus)	P	U	U	U	U	U	U	U	U	O	U	O			
Birds															
Common Loon (Gavia immer)	P	U								U		O			
Red-throated Loon (Gavia stellata)	W	R								O		O			
Horned Grebe (passerella iliaca)	M/W	R								U		O			
Eared Grebe (Podiceps nigricollis)	W	U								O		O			
Western Grebe (Aechmophorus accidentalis)	W	C								U		O			
Pied-billed Grebe (Podilymbus podiceps)	P	C								U		O			
Brown Pelican (Pelecanus occidentlis)	M	U								O		O			
Double-crested Cormorant (Phalacrocorax auritus)	P	C								O		O			
Great Blue Heron (Ardea herodias)	P	A	U	U	U	U	O	O	U	O		O	U		
Green Heron (Butorides striatus)	B	C					U	U		O		O			
Great Egret (Casmerodius albus)	P	R								O		O			
Black-crowned Night Heron (Nycticorax nycticorax)	P	U					U	U		O		O			
American Bittern (Botarus lentiginosus)	B	C								U		O			
Whistling Swan (Olor columbianus)	M/W	C	U							U		O			

Appendix D Wildlife Cont.

	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Pole/Sapling	Conifer Habitat: 2nd Growth	Mature	Old Growth	Hardwoods	Other Habitat: Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes/Cliffs	Other
Canada Goose (Branta canadensis)	M/W	C	U							U		O			
White-fronted Goose (Anser albifrons)	M	C	U							U		O			
Snow Goose (Chen caerulescens)	M/W	C								U		O			
Mallard (Anas platyrhynchos)	P	A	U			U	U	U		O		O			
Gadwall (Anas strepera)	M	C	U							U		O			
Pintail (Anas acuta)	M/W	C	U							U		O			
Green-winged Teal (Anas crecca)	M/W	C	U							U		O			
Blue-winged Teal (Anas discors)	M	C	U							U		O			
Cinnamon Teal (Anas cyanoptera)	B	C	U							U		O			
European Wigeon (Anas penelope)	S	R								U		O			
American Wigeon (Anas americana)	M/C	C	U							U		O			
Northern Shoveler (Anis clypeata)	M	C								U		O			
Wood Duck (Aix sponsa)	P	C				U	U	U	U	O		O	O		
Redhead (Aythya americana)	M/W	R								U		O			
Ring-necked Duck (Aythya collaris)	M	U								U		O			
Canvasback (Aythya valisineria)	W	U								U		O			
Greater Scaup (Aythya marila)	W	U								U		O			
Lesser Scaup (Aythya affinis)	W	U								U		O			
Common Goldeneye (Bucephala clangula)	S	U								U		O	O		
Barrow's Goldeneye (Bucephala islandica)	P	U								U		O	O		
Bufflehead (Bucephala albeola)	S	U					O	O		U		O	O		
Harlequin Duck (Histrionicus histrionicus)	P	U								O		O			
Ruddy Duck (Oxyura jamaicensis)	W	U								U		O			
Hooded Merganser (Lophodytes cucullatus)	P	U					U	U		O		O	O		
Common Merganser (Mergus Merganser)	PU						U	U		O		O	U		
Red-breasted Merganser (Mergus serrator)	W	U								O		O			
Turkey Vulture (Cathartes aura)	B	C	U	U				U	U	U	U		U	O	
Northern Goshawk (Accipiter gentilis)	S	U				U	O	O	U	U	U		U		
Sharp-shinned Hawk (Accipiter striatus)	P	C		U	U	U	U	U	U	U			U		
Cooper's Hawk (Accipiter cooperi)	P	U	U	U	U	U	U	U	U	U	U	O	U		
Red-tailed Hawk (Buteo jamaicensis)	P	CX	U	U		U	O	O	U	U	U	U	O	U	
Rough-legged Hawk (Buteo lagopus)	W	C	U	U					U	U	U	U	U		
Golden Eagle (Aquila chrysaetos)	S	R	U	U			O	O	U	U	U		O	O	
Bald Eagle (Haliaeetus leucocephalus)	P	U	U	U			O	O	U	O	U	O	O	U	
Northern Harrier (Circus cyaneus)	P	C	U	U					U	U	U	O	U		
Osprey (Pandion haliaetus)	B	U					O	O		U	O	O	U	U	
Peregrine Falcon (Falco peregrinus)	W	R	U	U			U	U	U	U	U	U	U	O	
American Kestrel (Falco sparverius)	P	C	O	U	U	U	U	U	U	U	O	U	O	U	
Blue Grouse (Dendragapus obscurus)	PC	UU	U	U	O	O	U	U	U	U	U	U			
Ruffed Grouse (Bonasa umbellus)	P	U		U	U	U	U		U	O	U	U			
California Quail (Lophortyx californicus)	P	U	U	U	U				U	U	U	U			
Mountain Quail (Oreortyx pictus)	P	C	U	U	U				U	U	U				

Appendix D Wildlife Cont.

	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Conifer Habitat: Pole/Sapling	Conifer Habitat: 2nd Growth	Conifer Habitat: Mature	Conifer Habitat: Old Growth	Hardwoods	Other Habitat: Riparian	Other Habitat: Dry Meadows	Other Habitat: Wetlands	Snags	Talus Slopes/Cliffs	Other
Ring-necked Pheasant (Phasianus colchicus)	P	C	U	U					U	U	U	U			
Virginia Rail (Rallus limicola)	B	C	U	LU						U		O			
Sora (Porzana carolina)	P	R	U							U		O			
American Coot (Fulica americana)	P	C	U	U						U		O			
Semi-palmated Plover (Calidris pusilla)	M		U							O		O			
Killdeer (Charadrius vociferus)	P	A	U							U		O			
Black-bellied Plover (Pluvialis squatarola)	M	C								O		O			
Common Snipe (Capella gallinago)	P	C	U	U						U		O			
Spotted Sandpiper (Actitis macularia)	B	C	U							O		O			
Greater Yellowlegs (Tringa melanoleucus)	M	C	U							U		O			
Lesser Yellowlegs (Tringa flavipes)	M	R	U							U		O			
Pectoral Sandpiper (Calidris melanotos)	M	C								O		O			
Baird's Sandpiper (Calidris bairdii)	M	C								O		O			
Least Sandpiper (Calidris minutilla)	M	A								O		O			
Long-billed Dowitcher (Limnodromus scolopaceus)	M	C										O			
Dunlin (Calidris alpina)												O			
Western Sandpiper (Calidris mauri)	M/W	C								O		O			
Wilson's Phalarope (Steganopus tricolor)	M	U								O		O			
Northern Phalarope (Lobipes lobatus)	M	C								O		O			
Glaucous-winged Gull (Larus glaucescens)	S	U								U		U			U
Western Gull (Larus occidentalis)	S	U								O		U			
Herring Gull (Larus argentatus)										U		U			U
California Gull (Larus californicus)	S	U	U							U		U			U
Ring-billed Gull (Larus delawarensis)	P	C	U							U		U			U
Bonaparte's Gull (Larus philadelphia)	M	U								O		O			
Band-tailed Pigeon (Columba fasciata)	B	C	U	O	U	U	O	O	U	U		O	U	U	
Rock Dove (Columba livia)	P	C	U											O	U
Mourning Dove (Zengida macroura)	P	C	U	U	U	U	U	U	U	U	U	U	U		
Barn Owl (Tyto alba)	P	U	U	U		U	U	U	U	U	U	U	U	U	O
Screech Owl (Otus asio)	P	U	U	U	U	U	O	O	lU	O	U	U	O		
Great Horned Owl (Bubo virginianus)	P	U	U	U	U	U	O	O	U	U	U	O	O		
Pygmy Owl (Glaucidium gnoma)	P		U	U	U	U	O	O	U	U	U		O		
Northern Spotted Owl (Strix occidentalis)	P	U				U	O	O		U			O		
Long-eared Owl (Asio otus)	P	U	U	U	U	U	U	U	U	U	U		O		
Short-eared Owl (Asio flammeus)	P	U	U	U						U	U	O			
Saw-whet Owl (Aegolius acadicus)	P	U					O	O	U	O		O	O		
Common Nighthawk (Chordeiles minor)	B	C	U	U					U	U	U			U	
Vaux's Swift (Chaetura vauxi)	B	C					O	O	U	U	U	U	O		U
Anna's Hummingbird (Calypte anna)	B		O	O						U	O	U			
Rufous Hummingbird (Selasphorus rufus)	B	A	O	O	U	U	U	U	U	U	O	U			
Belted Kingfisher (Megaceryle alcyon)	P	C							U	O		O	U		
Common Flicker (Colaptes auratus)	P	A	U	U	U	U	U	U	U	U	U	U	U	U	

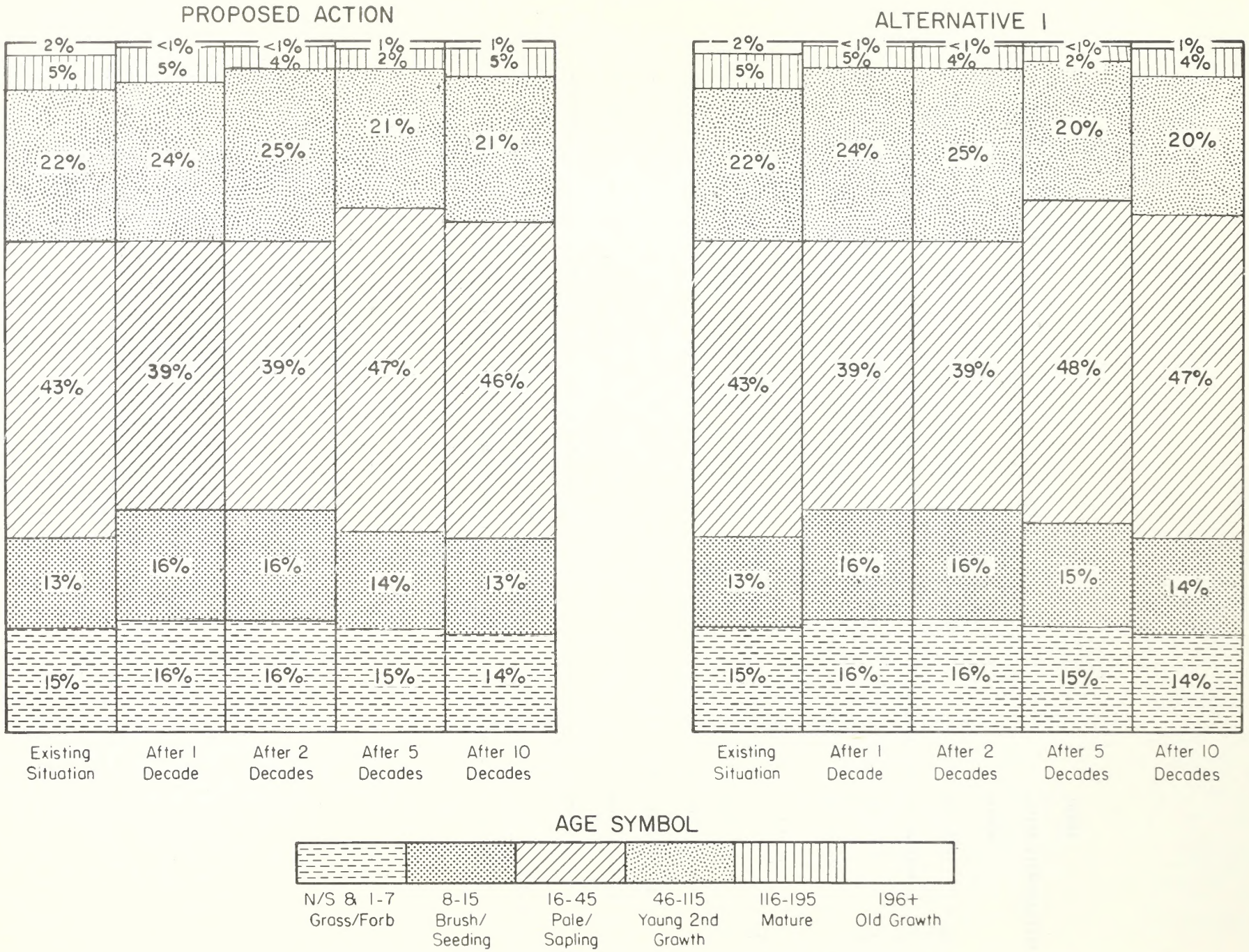
					Conifer Habitat					Other Habitat					
	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwoods	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes/Cliffs	Other
Western Bluebird (Sialia mexicana)	P	U	U	U					U		U		O		
Mountain Bluebird (Sialia currucoides)	S	U	U	U							O		O	O	
Townsend's Solitaire (Myadestes townsendi)	W	R	U	U	U	U	U	U	U	U	U		U	U	
Golden-crowned Kinglet (Regulus satrapa)	P	C		U	U	U	O	O	U	U		U			
Ruby-crowned Kinglet (Regulus calendula)	P	C		U	U	U	O	O	U	U		U			
Water Pipit (Anthus spinoletta)	W	C								O		O			
Bohemian Waxwing (Bombycilla garrulus)	S	U		U	U	U	U		U	U					
Cedar Waxwing (Bombycilla cedrorum)	P	C		U	U	U	U		U	O					
Northern Shrike (Lanius excubitor)	S	U	U	U						U	U	U			
Starling (Sturnus vulgaris)	P	A	U	U						U	U	U	U	O	
Hutton's Vireo (Vireo huttoni)	P	C		U	U	U	U	U	U		U				
Solitary Vireo (Vireo solitarius)	B	C			U	U	U	U	O		U				
Red-eyed Vireo (Vireo olivaceus)	B	R			U	U	U		O	O		U			
Warbling Vireo (Vireo gilvus)	B	C			U	U	U	U	U	O		U			
Orange-crowned Warbler (Vermivora celata)	B	C		U	U	U			U	U		U			
Nashville Warbler (Vermivora ruficapilla)	M	C		U	U	U			U	U		U			
Yellow Warbler (Dendroica petechia)	B	C		U	U	U	U	U	U	O		U			
Yellow-rumped Warbler (Dendroica coronata)	P	U		U	U	U	U	U	U	U		U			
Black-throated Gray Warbler (Dendroica nigrescens)	B	C		U	U	U			U	U		U			
Townsends Warbler (Dendroica townsendi)	M/W	U				U	O	O	U	U		U			
Hermit Warbler (Dendroica occidentalis)	B	C				U	O	O	U	U		U			
MacGillivray's Warbler (Oporornis tolmiei)	B	C		U	U	U	U		U	U	U	U			
Yellowthroat (Geothlypis trichas)	B	C	U	U					U	O	U	U			
Yellow-breasted Chat (Icteria virens)	B	C		U	U	U			U	O		U			
Wilson's Warbler (Wilsonia pusilla)	B	C		U	U				U	O		U			
House Sparrow (Passer domesticus)	P	C													U
Western Meadowlark (Sturnella neglecta)	P	C		U	U						U	U			
Yellow-headed Blackbird (Xanthocephalus xanthocephalus)	B	R								O		O			
Red-winged Blackbird (Agelaius phoeniceus)	P	C	U	U					U	O		O			
Northern Oriole (Icterus galbula)	BaU	U	U						U	O		U			
Brewer's Blackbird (Euphagus cyanocephalus)	P	A	U	U	U				U	U	U	U			
Brown-headed Cowbird (Molothrus ater)	B	U	U	U	U				U	U	U	U			
Western Tanager (Piranga ludoviciana)	B	C			U	U	O	O	U	U		U			
Black-headed Grosbeak (Pheucticus melanocephalus)									U	O		U			
Lazuli Bunting (Passerina amoena)	B	C		LU	U				LU	U	U				
Evening Grosbeak (Hesperiphona vespertina)	P	C		U	U	U	O	O	U	U		U			
Purple Finch (Carpodacus purpureus)	P	C			U	U	U	U	U	U					
House Finch (Carpodacus mexicanus)	P	C		U	U	U			U	U		U			U
Pine Siskin (Carduelis pinus)	P	C	U	U	U	U	O	O	U	U					
American Goldfinch (Carduelis tristis)	P	C	O	O	U	U			U	U	O				
Lesser Goldfinch (Carduelis psaltria)	P	R	O	U	U	U					O				
Red Crossbill (Loxia curvirostra)	P	?				U	O	O	U	U					

Appendix D Wildlife Cont.

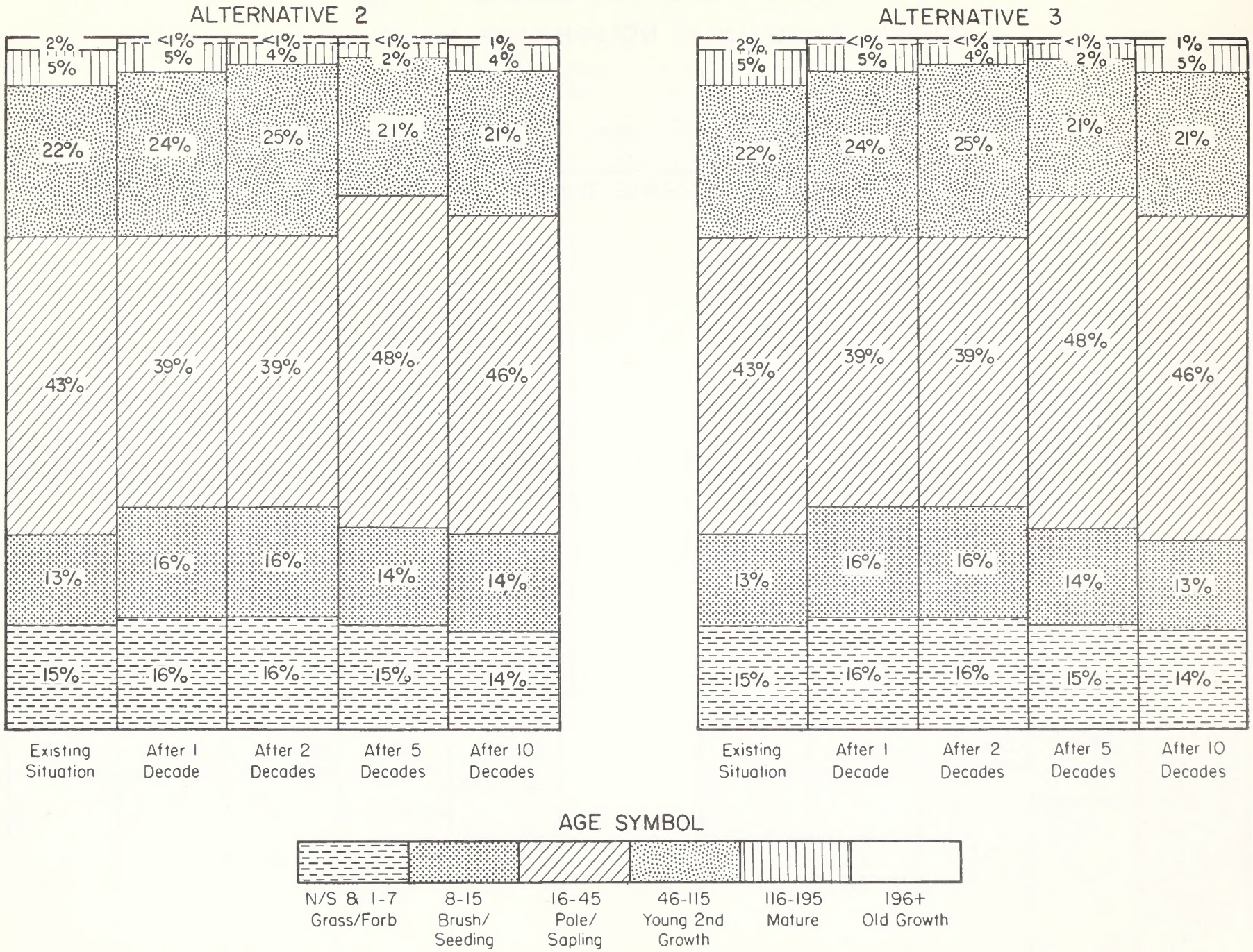
	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Conifer Habitat: Pole/Sapling	Conifer Habitat: 2nd Growth	Conifer Habitat: Mature	Conifer Habitat: Old Growth	Other Habitat: Hardwoods	Other Habitat: Riparian	Other Habitat: Dry Meadows	Other Habitat: Wetlands	Other Habitat: Snags	Talus Slopes/Cliffs	Other
Pileated Woodpecker (Dryocopus pileatus)	P	U					O	O	U	U			O		
Acorn Woodpecker (Melanerpes formicivorus)	P	C							O	U			O		
Lewis Woodpecker (Melanerpes lewis)	W	C	U	U	U	U	U	U	U	U	U		O		
Yellow-bellied Sapsucker (Sphyrapicus varius)	P	C		U	U	U	O	O	U	O		U	O		
Hairy Woodpecker (Picoides villosus)	P	U		U	U	U	O	O	U	U		U	O		
Downy Woodpecker (Picoides pubescens)	P	U		U	U	U	U	U	O		O	O			
Western Kingbird (Tyrannus verticalis)	M	R	U	U			U		U	U	U			U	
Say's Phoebe (Sayornis saya)	M	U	U	U					U	U	U			U	
Alder Flycatcher (Empidonax alnoum)	B	C	U	U	U	U	U	O		O					
Willow Flycatcher (Empidonax traillii)	B	C		U	U	U	U		U	O		O			
Hammond's Flycatcher (Empidonax hammondii)	B	?					U	O	O	U	U		U		U
Western Flycatcher (Empidonax difficilis)	B	C				U	O	O	U	O		O			
Western Wood Pewee (Contopus sordidulus)	B	C		U	U	U	U	U	U	U		U			
Olive-sided Flycatcher (Nuttallornis borealis)	B	U	U	U	U	U	U	U	U	U		U	U		
Horned Lark (Eremophila alpestris)	P	C	U								U				
Violet-green Swallow (Tachycineta thalassina)	B	C	U	U	U	U	U	U	U	U	U	U	O	U	
Tree Swallow (Iridoprocne bicolor)	B	C	U	U			O	O	U	U	U	U	O		
Rough-winged Swallow (Stelgidopteryx ruficollis)	B	C	U							O		U		O	
Barn Swallow (Hirundo rustica)	B	U	U						U	O	U	O		U	U
Cliff Swallow (Petrochelidon pyrrhonota)	B	C	U						U	U	U			O	
Purple Martin (Progne subis)	B	U	U	U			O	O	U	O		O	O		
Gray Jay (Perisoreus canadensis)	B	U			U	U	O	O	U	U		U	U		
Steller's Jay (Cyanocitta stelleri)	P	C		U	U	U	U	U	U	U				U	
Scrub Jay (Aphelocoma coerulescens)	P	C			U	U	U		U	U	U		U		
Northern Raven (Corvus corax)	P	U	U	U	U	U	O	O	U	U	U	U	U		
American Crow (Corvus brachyrhynchos)	P	A	U	U	U	U	U	U	U	U	U	U	U		
Black-capped Chickadee (Parus atricapillus)	P	C		U	U	U	U	U	U	O		U	O		
Chestnut-backed Chickadee (Parus rufescens)	P	C			U	U	O	O		U		U	O		
Bushtit (Psaltriparus minimus)	P	U		U	U	U			U	U		U			
White-breasted Nuthatch (Sitta carolinensis)	P	C		U	U	U	U	U	U	U			O		
Red-breasted Nuthatch (Sitta canadensis)	P	U			U	U	O	O	U	U			O		
Brown Creeper (Certhia familaris)	P	U				U	O	O	U	U			U		
Wrentit (Chamaea fasciata)	P	C		O	U					U		U			
Dipper (Cinclus mexicanus)		P	C						U	O		O			
House Wren (Troglodytes aedon)	B	U		U	U	U			U	U		U	O		
Winter Wren (Troglodytes trogladytes)	P	C		U	U	U	O	O	U	O		U			
Bewick's Wren (Thryomanes bewickii)	P	C			U	U	U	U	U	U		U	U		
Long-billed Marsh Wren (Cistothorus palustris)	P	C								U		O			
American Robin (Turdus migratorius)	P	A	U	U	U	U	U	U	U	U	U	U			
Varied Thrush (Ixoreus naevius)	P	C			U	U	O	O	U	U					
Hermit Thrush (Catharus guttata)	W	C			U	U	O	O	U	U		U			
Swainson's Thrush (Catharus ustulata)	B	C		U	U	U	U	U	U	O		U			

Appendix D Wildlife Cont.

	Resident	Relative Abundance	Grass/Forb	Bush/Seedling	Pole/Sapling	2nd Growth	Mature	Old Growth	Hardwoods	Riparian	Dry Meadows	Wetlands	Snags	Talus Slopes/Cliffs	Other
					Conifer Habitat				Other Habitat						
Rufous-sided Towhee (Pipilo erythrophthalmus)	P	A		U	U	U			U	U	U	U			
Savannah Sparrow (Passerculus sandwichensis)	P	C	U								U				
Vesper Sparrow (Pooecetes gramineus)	B	C	U	U							U				
Dark-eyed Junco (Junco hyemalis)	P	C	U	U	U	U	U	U	U	U	U	U			
Chipping Sparrow (Spizella passerina)	P	C	U	U	U	U			U	U	U				
White-crowned Sparrow (Zonotrichia leucophrys)	P	C	U	U	U					U	O				
Golden-crowned Sparrow (Zonetrichia atricapilla)	W	A	U	U					U		O				
White-throated Sparrow (Zonotrichia albicollis)	S	U	U	U							U				
Fox Sparrow (Passerella iliaca)	W	C		U	U	U				U	U	U			
Lincoln's Sparrow (Melospiza lincolnii)	M/W	C		U	U				U	O		O			
Song Sparrow (Melospiza melodia)	P	A	U	U	U				U	U	U	U			
Reptiles															
Western Pond Turtle (Clemmys marmorata)	P	C								O		O			
Painted Turtle (Chrysemys picta)	P	C								O		O			
Western Fence Lizard (Sceloporus occidentalis)	P	C	U	U					U	U	O			U	
Western Skink (Eumeces skiltonianus)	P	C	U	U					U	U	O			U	
Northern Alligator Lizard (Gerrhonotus coeruleus)	P	C	U	U					U	U	O			U	
Rubber Boa (Charina bottae)	P	C			U	U	U	U	U	U	U				
Ringneck Snake (Diadophis punctatus)	P	R	U	U	U	U	U	U	O	U	O				
Sharp-tailed Snake (Contia tenuis)	P	U	U	U	U	U	U	U	O	U	O				
Western Yellow-bellied Racer (Coluber constrictor)	P	C	O	U					U	U	O				
Pacific Gopher Snake (Pituophis melanoleucus)	P	C	U	U	U	U	U	U	U	U	U			U	
Common Garter Snake (Thamnophis sirtalis)	P	C	U	U	U	U	U	U	U	O	U	O			
Western Terrestrial Garter Snake (Thamnophis elegans)	P	C	U	U	U	U	U	U	U	O	U	O			
Western Aquatic Garter Snake (Thamnophis couchi)	P	C	U	U	U	U	U	U		O		O			
Northwestern Garter Snake (Thamnophis ordinoides)	P	C	U	U	U				U	U	U				
Amphibians															
Northwestern Salamander (Ambystoma gracile)	?	C	U	U		U	U	U	U	O		O			
Pacific Giant Salamander (Dicamptodon ensatus)	P	C				U	U	U	U	O		O			
Olympic Salamander (Rhyacotriton olympicus)	P	C					U	U	U	O		O		U	
Rough-skinned Newt (Taricha granulosa)	P	C	U	U	U	U	U	U	U	O		O			
Dunn's Salamander (Plethodon dunni)	P	C					U	U	U	O		O		U	
Western Red-backed Salamander (Plethodon vehiculum)	P	C		U	U	U	U	U	U	O		O		U	
Oregon Salamander (Ensatina eschscholtzi)	P	C				U	O	O		O		O			
Clouded Salamander (Aneides ferreus)	P	C					O	O		O		O			
Tailed Frog (Ascaphus truei)	P	U	U	U	U	U	U	U		O		O			
Western Toad (Bufo boreas)	P	C	U	U	U	U			U	O		O			
Pacific Tree Frog (Hyla regilla)	P	C	U	U	U	U	U	U	U	O		O		U	
Red-legged Frog (Rana aurora)	P	C	U			U	U	U	U	O		O			
Western Spotted Frog (Rana pretiosa)	P	R	U	U	U	U				O		O			
Yellow-legged Frog (Rana boylei)	P	C				U	U	U	U	O		O			
Bullfrog (Rana catesbeiana)	P	C							O	O		O			

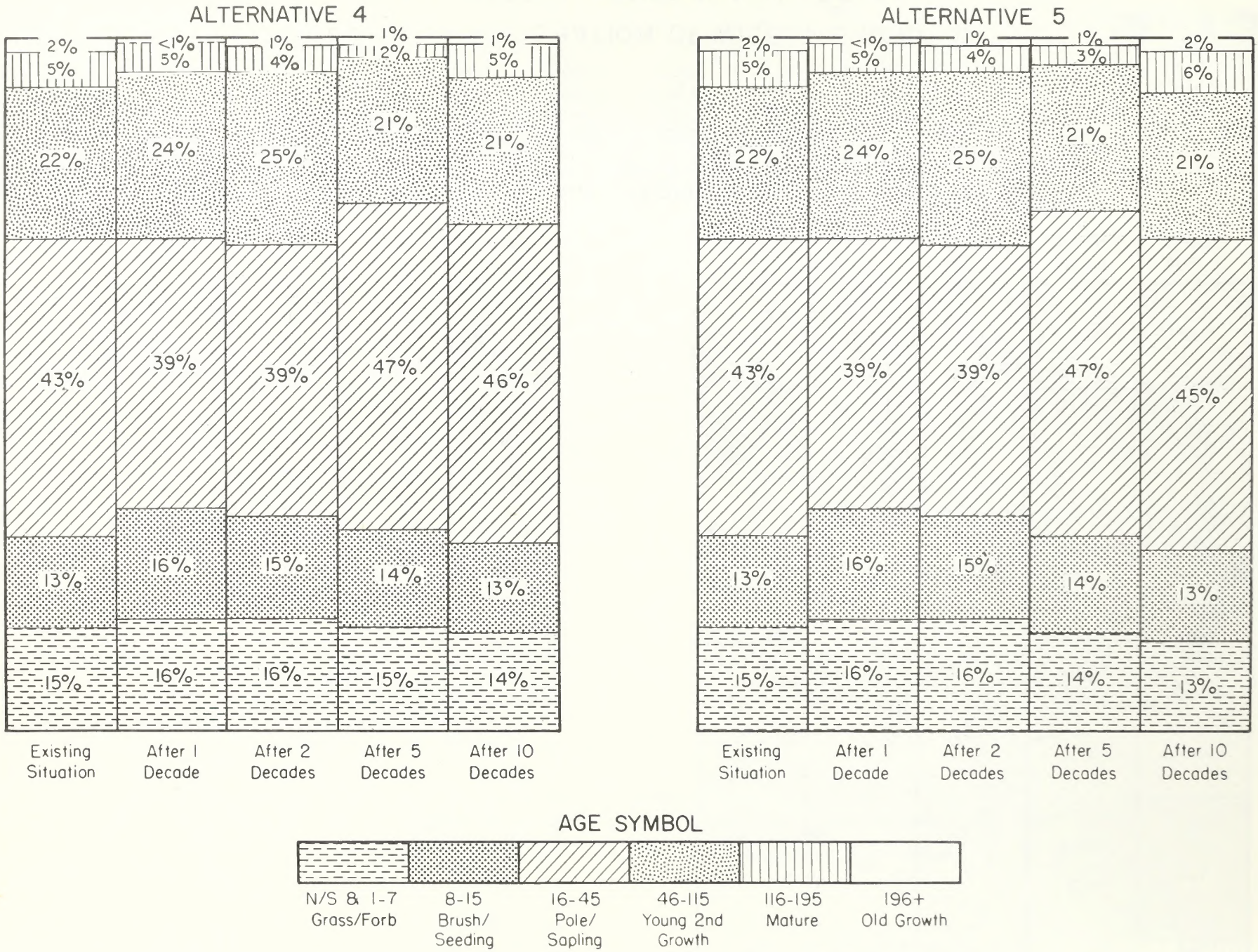


PREDICTED ALTERATION OF WILDLIFE HABITAT ON ALL FOREST LANDS IN N.W. OREGON

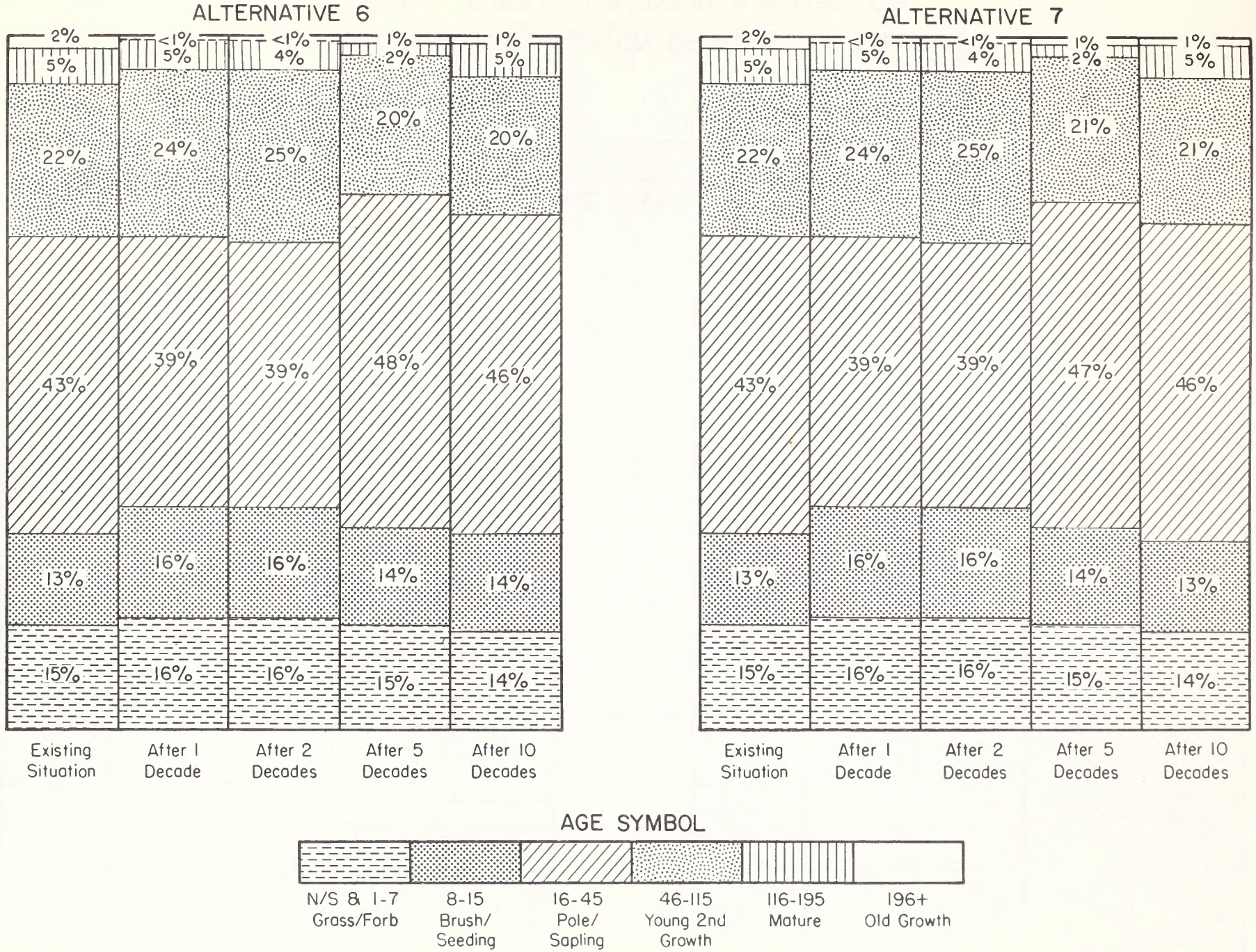


PREDICTED ALTERATION OF WILDLIFE HABITAT

ON ALL FOREST LANDS IN N.W. OREGON



PREDICTED ALTERATION OF WILDLIFE HABITAT ON ALL FOREST LANDS IN N.W OREGON



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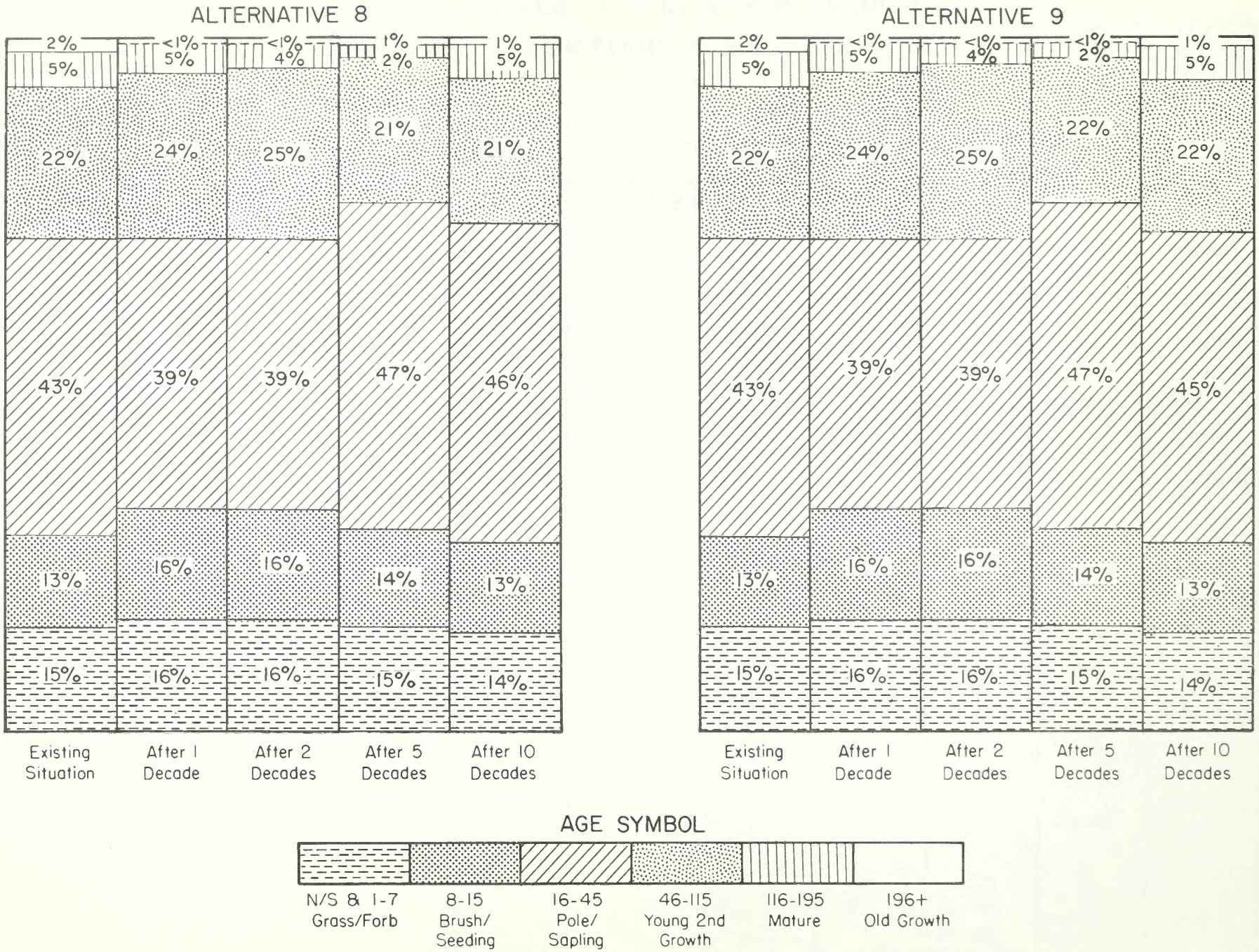

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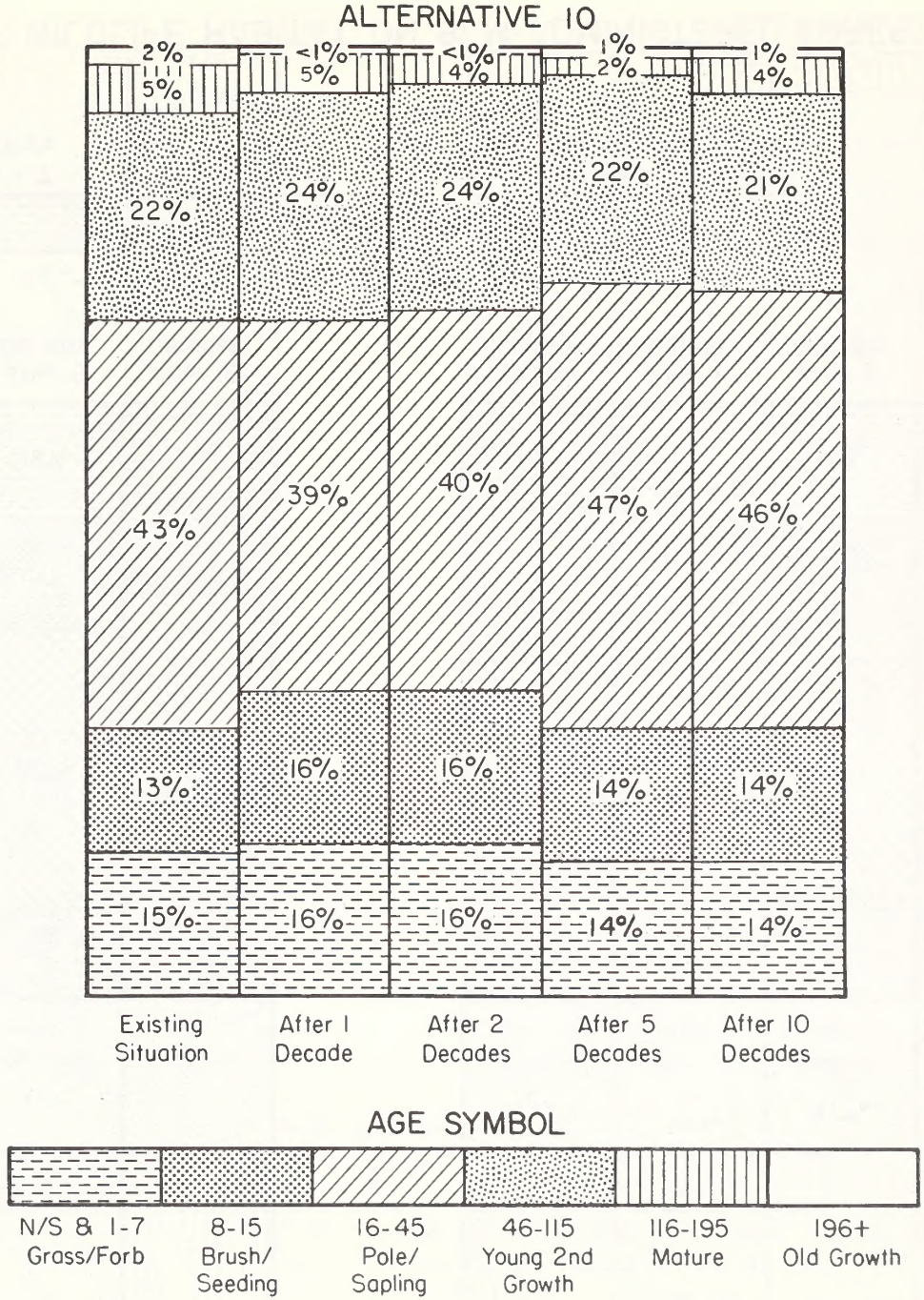
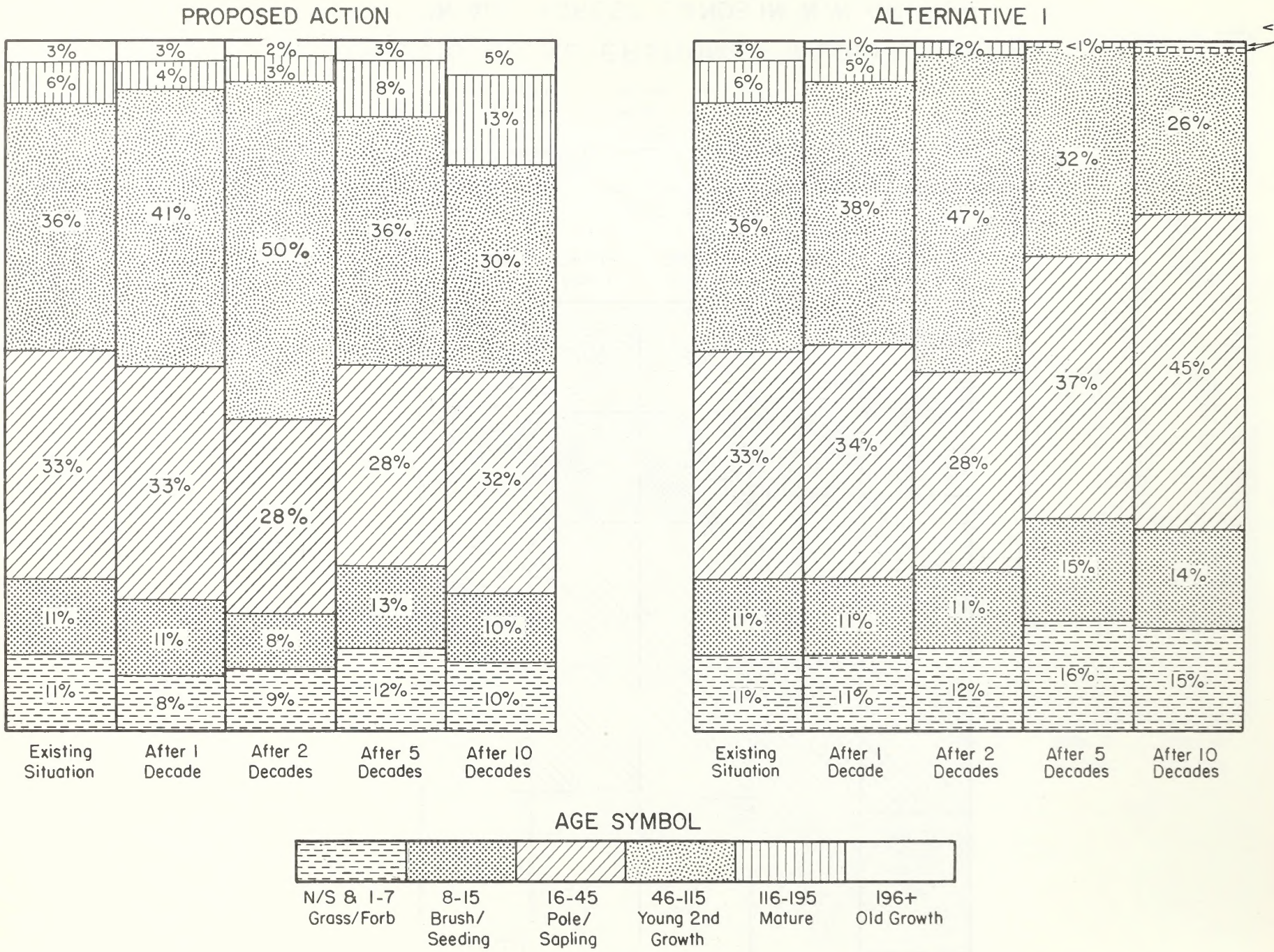
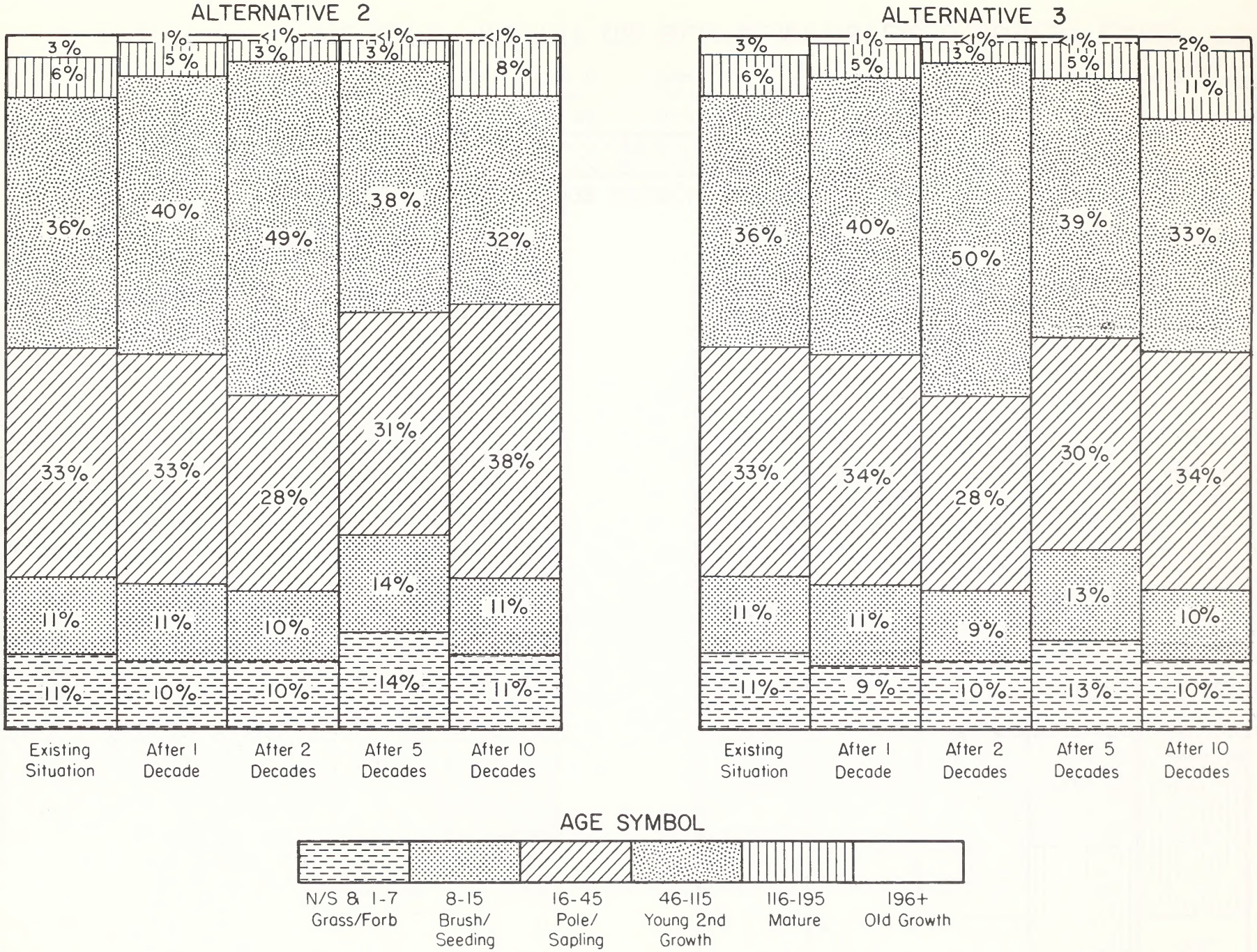


PREDICTED ALTERATION OF WILDLIFE HABITAT ON ALL FOREST LANDS IN N.W. OREGON



ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND



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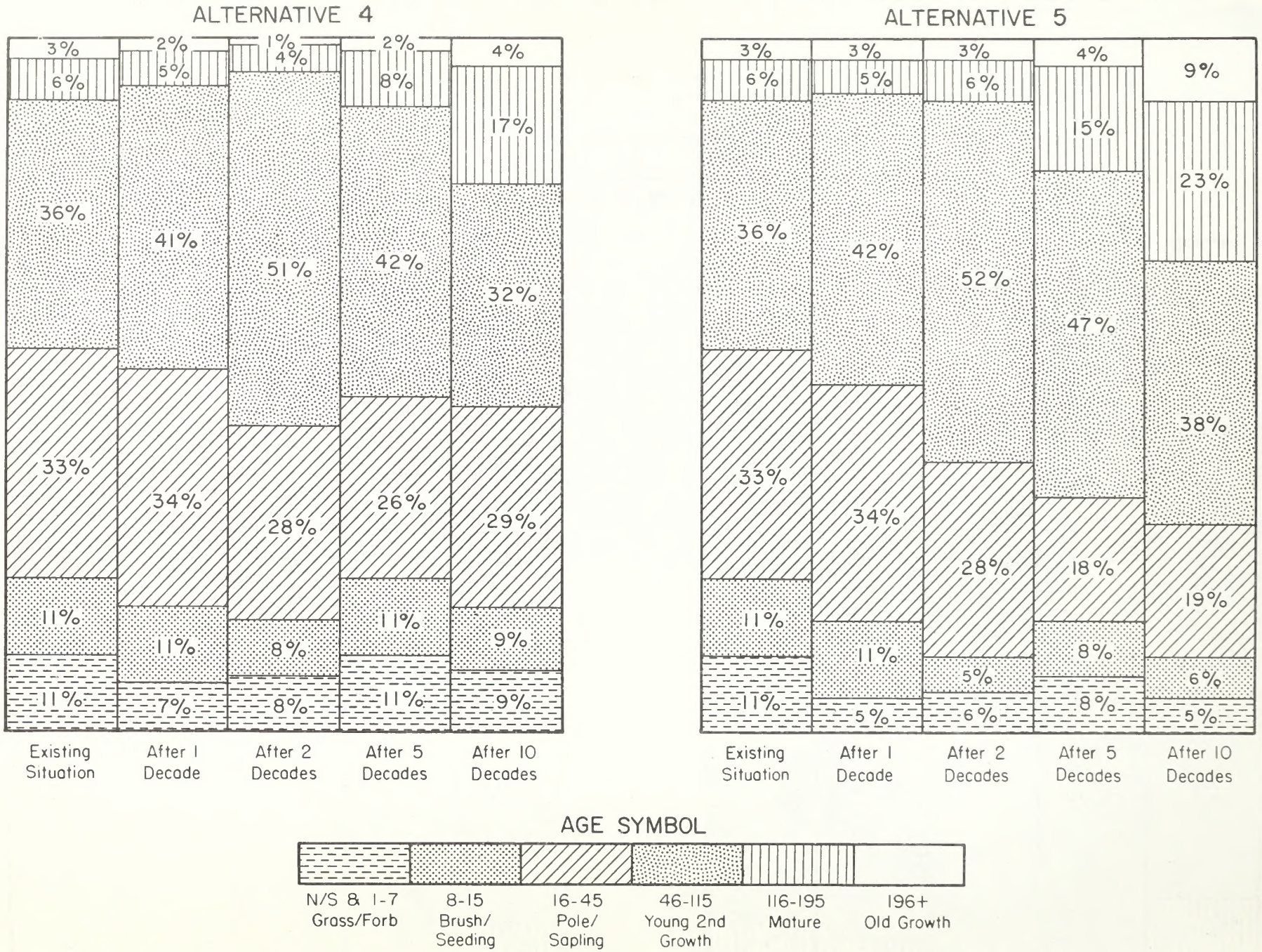

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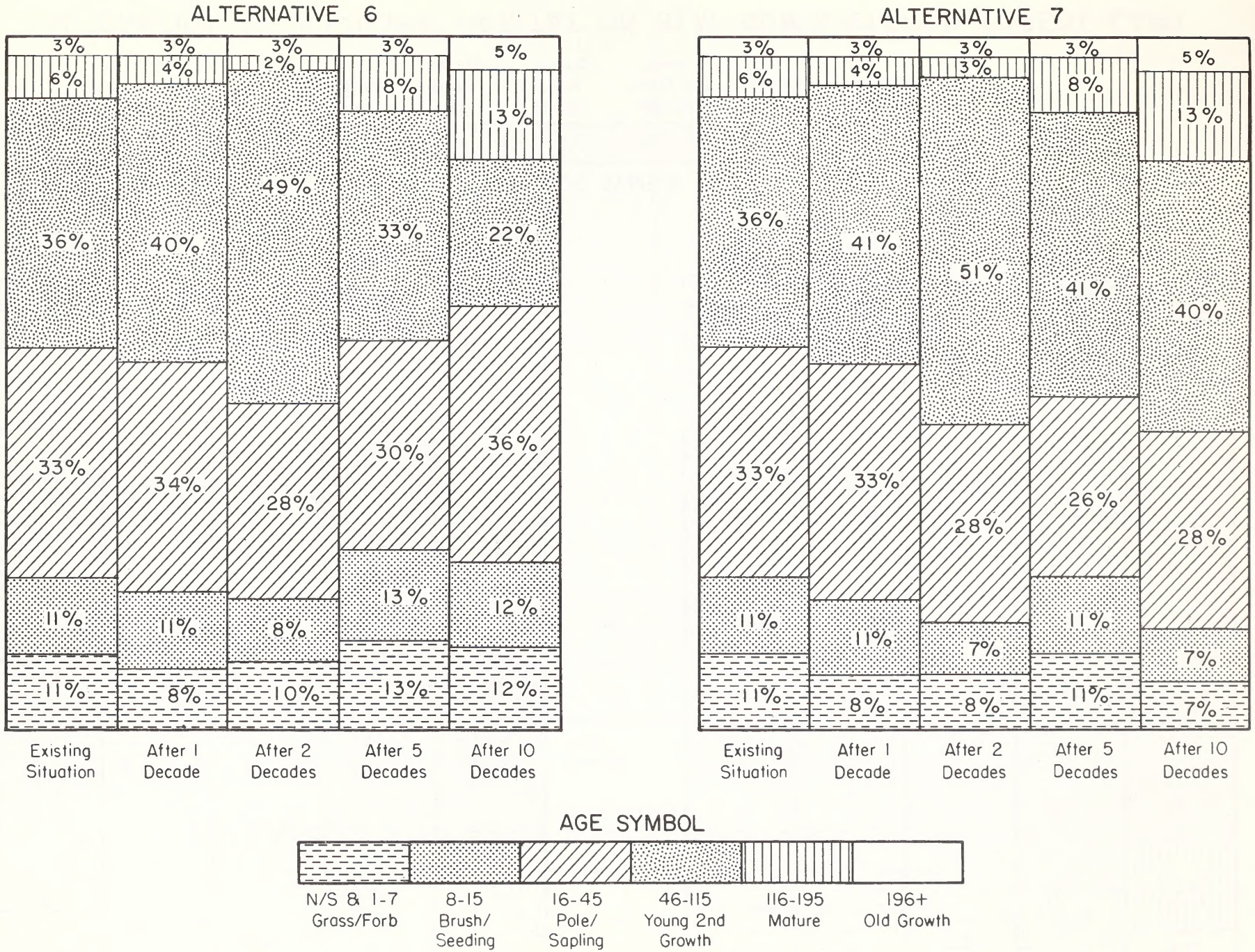

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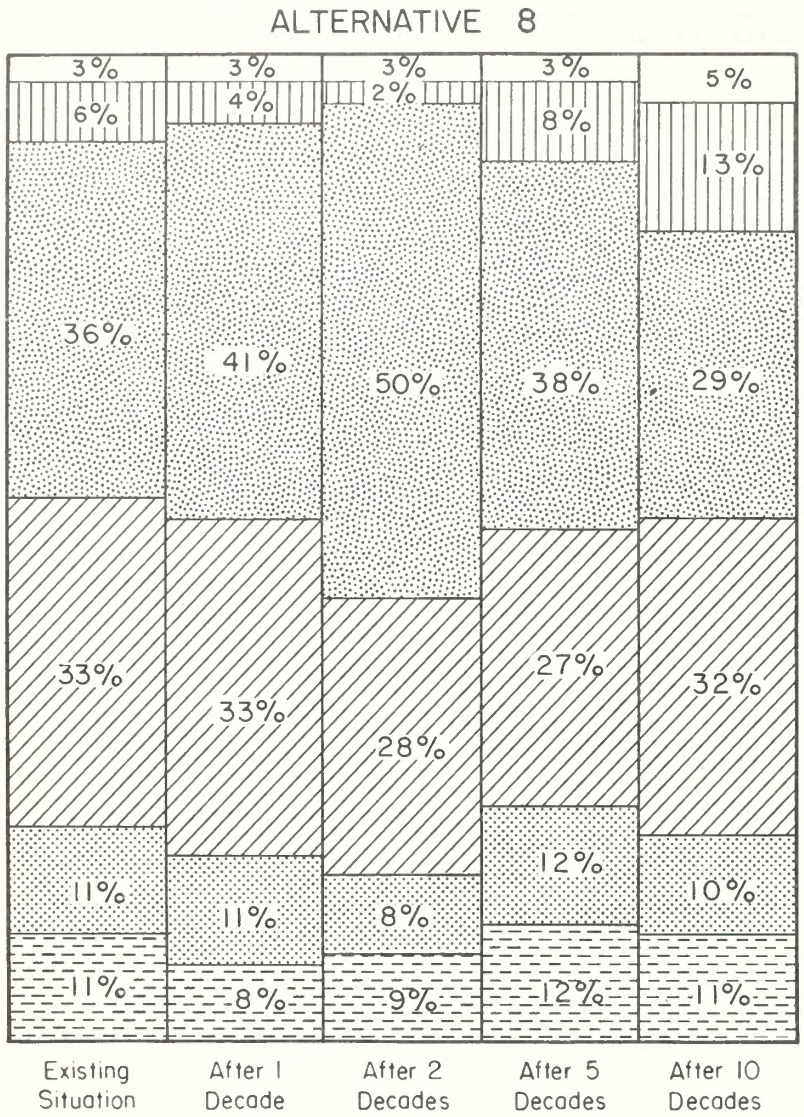

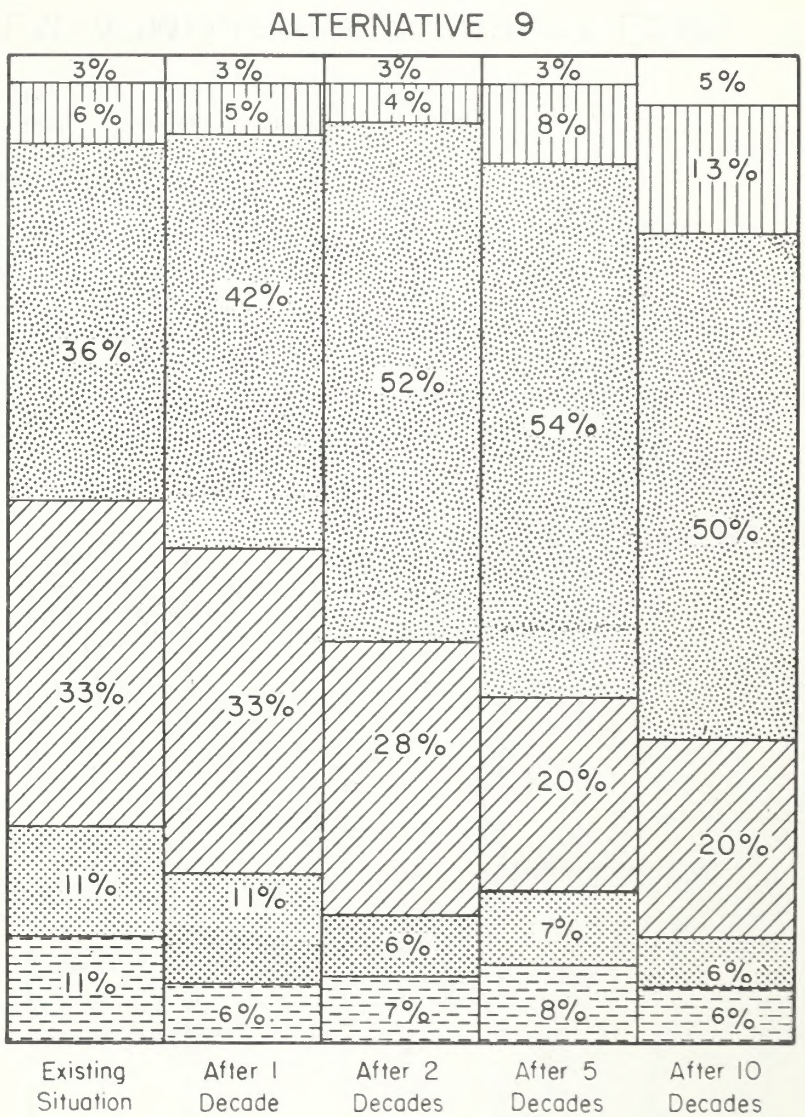

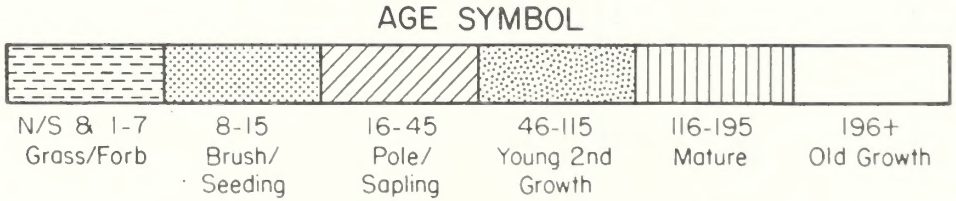

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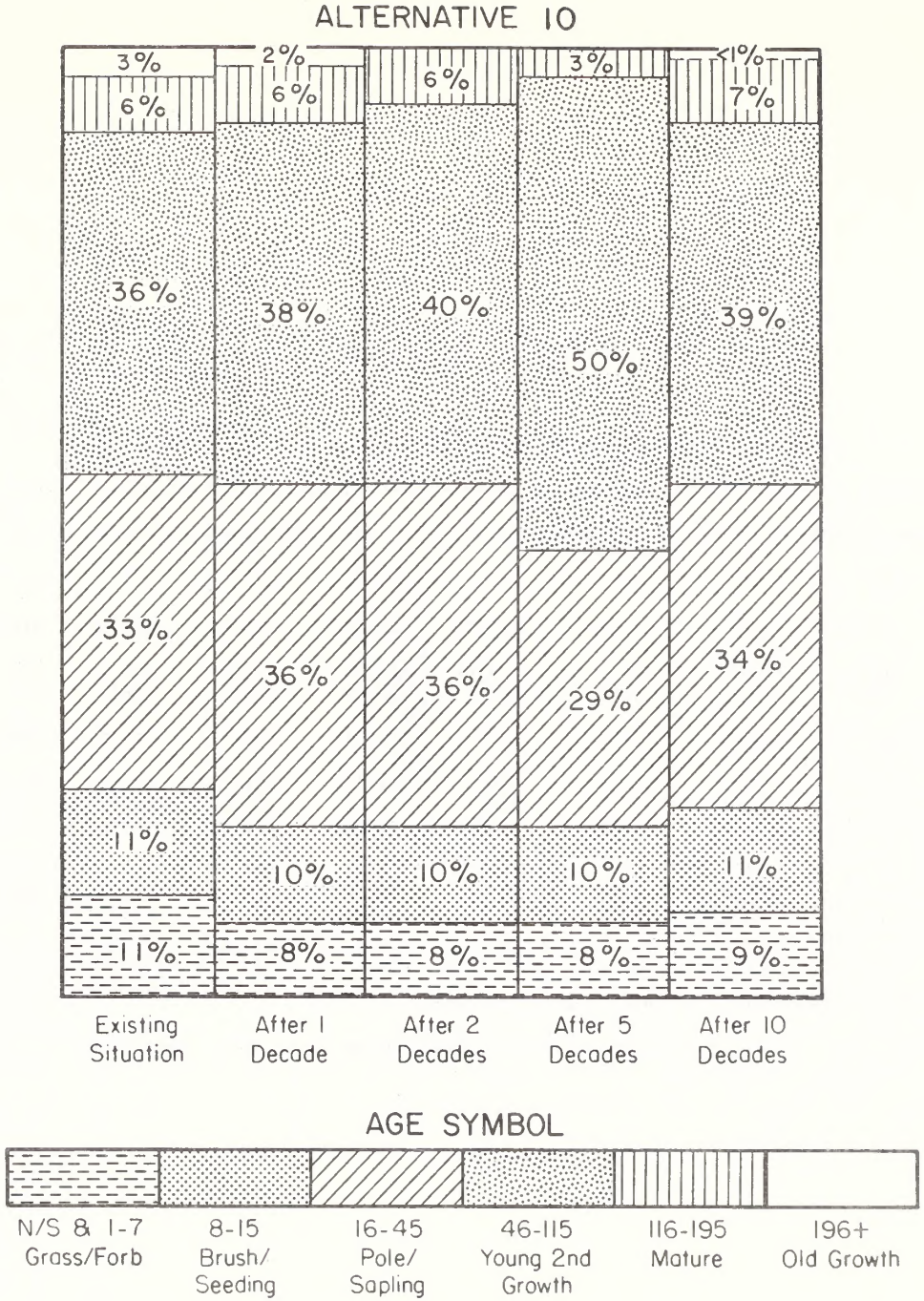

ALTERATION OF WILDLIFE HABITAT ON BLM-ADMINISTERED FOREST LAND

Appendix G Estimation of Employment in Forest Management 1/

Treatment	Worker Days Per Acre	Number of Acres Treated in First Decade										
		Proposed Action	Alt. 1 Max. Tbr	Alt. 2 Str. Tbr.	Alt. 3 Emp. Tbr.	Alt. 4 Emp. Other	Alt. 5 Full Eco.	Alt. 6 Lo MHS	Alt. 7 Hi MHS	Alt. 8 No Herb.	Alt. 9 No ACE	Alt. 10 No Action
Site Preparation 2/												
Herbicide 3/	.025	5,400	6,572	6,104	5,883	4,838	3,447	5,400	5,400	0	5,400	5,400 4/
Mechanical	1.000	4,300	4,960	4,300	4,300	3,866	2,970	4,300	4,300	4,300	4,300	4,300 4/
Stand conversion	1.667	1,010	770	1,220	1,220	1,090	640	1,010	1,010	1,010	1,010	1,500
Planting:												
Initial	.667	22,105	29,385	25,812	23,846	20,817	15,045	22,863	20,728	21,659	16,867	22,710
Replanting	.667	8,400	11,166	9,809	9,061	7,911	5,718	8,688	7,877	8,230	6,409	8,630
Plantation protection	.500	9,590	10,470	9,590	9,590	8,699	6,391	9,590	9,590	9,590	9,590	9,590 4/
Mtnc. and release:												
Herbicide	.025	13,000	15,582	14,625	13,466	11,652	8,330	13,000	11,726	-	9,421	13,100 4/
Manual	1.667	-	-	-	-	-	-	-	-	3,370	-	-
Precommercial thinning	.667	3,581	3,905	3,698	3,559	3,188	3,163	3,581	3,581	3,581	3,581	3,581 4/
Fertilization	.025	4,280	4,669	4,490	4,293	3,615	3,305	4,280	4,280	4,280	4,280	4,280 4/
Total worker-days 5/		34,516	42,236	38,420	36,478	32,258	24,003	35,214	33,217	38,828	29,605	35,892
Total jobs 6/		14	17	15	15	13	10	14	13	16	12	14

1/ Employment net of timber harvest employment (logging and associated road construction and slash burning) calculated by multiplying estimates of worker-days/acre times treatment acreages.

2/ Broadcast burning acreage is omitted from the estimation of employment on the assumption that most of the clearcut burning is now performed by loggers harvesting timber and thus is already accounted for.

3/ For each alternative except Alternative 8, it is estimated that 450 man-days per decade would be required to perform cut stump treatment on 600 acres of the acreage shown instead of aerial treatment.

4/ Assumed for purpose of employment calculations only.

5/ Sum of products of acres treated times worker-days per acre.

6/ Worker-days for decade converted to average annual number of jobs on basis of 250 work days per year. Jobs in each county estimated in proportion to historical distribution of WSSYUs harvest (Table 2-17).

GLOSSARY

GLOSSARY OF TERMS

Absorb - To be held within the structure of a substance.

Acre-foot - The volume of water that will cover 1 acre to a depth of 1 foot.

Allowable Cut - The amount of forest products that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

Allowable Cut Effect (ACE) - The immediate increase in today's allowable cut which is justified by expected future increases in yields due to present or proposed management treatments.

Allowable Cut Determination Process - A process which deals with the steps involved in the development and evaluation of alternative levels of timber production for the purpose of establishing an allowable cut.

Ambient - Surrounding, on all sides; for air, refers to any unconfined portion of the atmosphere.

Anadromous Fish - Fish which migrate from the sea to breed in fresh water. Their offspring return to the sea.

Aquifer - A geologic formation or structure that transmits water in sufficient quantity to supply the needs for a water development; usually saturated sands, gravel, fractures, and cavernous and vesicular rock. The term water-bearing is sometimes used synonymously with aquifer when a stratum furnishes water for a specific use.

Archeological Resources - All evidences of past human occupations other than historical documents, which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental data and all other relevant information.

Area of Critical Environmental Concern (ACEC) - An area within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards (FLPMA Sec. 103(a)).

Aspect - The direction a slope faces.

Average Employment - The sum of number of employees, reported monthly, divided by twelve; because employment is reported for all employees working during any one month, it is a modest over-estimate of full-time equivalent employment.

Background - The area of a distance zone which lies beyond the foreground-middleground. Usually from a minimum of 3 to 5 miles to a maximum of about 15 miles from a travel route, use area, or other observer position.

Background Levels - Amounts of pollutants present from natural sources and from human disturbances which have reached equilibrium.

Basal Area - The area of the cross-section of a tree stem near its base, generally at breast height and inclusive of bark. It is usually expressed as square feet per acre.

Bedload - The sediment that moves by sliding, rolling or bounding, on or very near, the streambed.

Biome - The largest land community unit (plant and animal) which is convenient to recognize.

Board Foot - A unit of solid wood, 1-foot square and 1-inch thick.

British Thermal Unit (BTU) - A unit of heat equal to 252 calories; quantity of heat needed to raise the temperature of one pound of water from 62° F. to 63° F.

Broadcast Burning - Intentional burning in which fire is intended to spread over all of a specific area. It may or may not qualify as prescribed burning.

Bucking - Cutting trees into log lengths.

Buffer Strip - A protective area adjacent to an area requiring special attention or protection.

Bureau Planning System - A process used in the BLM to establish land use allocations, constraints, and objectives for various categories of public land use.

Characteristic Landscape - The established landscape within a physiographic province. The term does not necessarily mean "naturalistic character." It could refer to farm lands, timber lands or other landscapes which exhibit both physiographic and land use similarities.

Clearcutting - A method of timber harvesting in which all trees, merchantable or unmerchantable, are cut from an area.

Commercial Forest Land - Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species.

Commercial Thinning - Partial cuttings made in merchantable stands (40-70 years old) in order to stimulate the growth of remaining trees and increase total yield from the stand.

Community Income Effect - The sum of direct and indirect personal income generated by a change, e.g., timber harvest. Indirect personal income results from economic activity stimulated in other local enterprises by purchase of goods and services, primarily of a support nature.

Constrained Timber Production Base - Base Acreage managed for timber production at a lesser intensity in consideration for other resource management objectives i.e. minimum harvest age of 350 years for wildlife habitat (see Intensive Timber Production Base).

Contrast - The effect of a striking difference in the form, line, color or texture of the landscape features within the area being viewed.

Contrast Rating System - A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature (land and water form, vegetation and structures).

Critical Habitat - That habitat considered by the Secretary of the Interior to be necessary to the normal needs or survival and recovery of listed Threatened or Endangered Species. It may also include habitat not currently occupied into which a listed species could expand.

Cull - A tree or log which is rejected because it does not meet certain specifications.

Cultural Resources - Those fragile and nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features, that were of importance in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred--even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource. Cultural resources, including both prehistoric and historic remains, represent a part of the continuum of events from the earliest evidences of man to the present day.

Debris Avalanche - Fast moving failures of shallow, generally cohesionless soils on steep slopes over an impermeable failure surface.

Debris Torrent - A very fluid mass of soil, rock and vegative debris that moves rapidly down steep, narrow stream channels.

Discharge - Rate of flow of a fluid, the volume of fluid passing a point per unit of time, commonly expressed as cubic feet per second (cfs), million gallons per day, gallons per minute, or cubic meters per second.

Distance Zone - The area that can be seen as foreground-middleground, background, or seldom-seen.

Ecosystem - An ecological unit consisting of both living and nonliving components which interact to produce a natural, stable system.

Environmental Assessment (EA) - A systematic environmental analysis of site-specific BLM activities used to determine whether such activities have a significant affect on the quality of the human environment and whether a formal environmental statement is required.

Environmental Impact Statement (EIS) - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major Federal action.

Erosion (soil) - Removal of soil from its place of origin to a point of deposition other than a stream channel.

Even Flow - Maintaining a relatively constant undiminishing supply of timber from year to year for the planning cycle.

Experience Opportunity - The opportunity for a person to realize predictable phychological and physiological outcomes from engaging in a specific recreation activity within a specific setting.

Fauna - All the animals in a given area.

Final Harvest Cut - Constitutes removal of a mature stand, either through clear cutting, the final stage of a shelterwood regime, or overstory removal.

Flora - All the plants in a given area.

Forbs - Herbaceous plants; most often used pertaining to herbaceous plants eaten by wildlife.

Foreground-middleground - The area visible from a travel route, use area, or other observer position to a distance of about 3 to 5 miles. The outer boundary of this zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. Vegetation is apparent only in patterns or outline.

Forest Canopy - The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

Forest Land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use.

Forest Management Program - Includes timber activity plan and all forest resource related program activity plans.

Forest Type Island - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement and condition to be distinguishable from vegetation on adjoining areas.

Groundwater - Subsurface water in the zone of saturation.

Growing Stock - The amount of standing, green timber retained to produce forest products; also known as forest capital.

Habitat - The environment in which an organism occurs.

High-lead Logging - A cable yarding system in which lead blocks are hung on a spar or tower to provide lift to the front end of logs giving partial suspension.

Historic Resources - All evidences of human activity that date from historic (i.e., recorded history) periods. These resources include documentary data (i.e., written records, archival material, photographs, maps, etc.), sites, artifacts, environmental data, and all other relevant information. Also included are loctions where documented historical events took place, even though no physical evidence of the events remain other than the setting. Historic resources are cultural resources and may be considered archeological resources when archeological work is involved in their identification and interpretation.

Igneous Rock - Rock formed from the cooling and solidification of molten rock.

Infiltration (soil) - Downward entry of water into the soil.

Intensive Forest Management Lands - All commercial forest land that is part of the timber production base for allowable cut calculation in the South Coast-Curry Sustained Yield Units.

Intensive Timber Production Base - Base Acreage intensively managed for timber production using a 50 year minimum harvest age in the allowable cut computation.

Intermediate Cuttings - Any removal of merchantable trees from a stand prior to the final harvest cutting, i.e., commercial thinning, sanitation/salvage, or shelterwood regeneration cuttings.

Landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

Landscape Features - The land and water form, vegetation, and structures which compose the characteristic landscape.

Leach - Usually refers to the movement of chemicals through soil by water; may also refer to movement of herbicides out of leaves, stems or roots into the air or soil.

Log Flows - Destinations of harvested timber by origin. Origins used herein are management units and counties or county groupings; destinations are communities, counties or groupings of counties within which the primary processing of timber takes place.

Lumber and Wood Products, except Furniture - Defined by the Office of Management and Budget the Standard Industrial Classification Manual as Major Group #24, which includes logging contractors engaged in cutting timber and pulpwoods; merchant sawmills, lath mills, shingle mills, planing mills, plywood mills, and veneer mills engaged in producing lumber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are classified in Major Group #25.

Management Framework Plan (MFP) - Land use plan for public lands which provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

Mass Failure - See Mass Movement.

Mass Movement - Downslope movement of soil and rock caused by gravity; may be slow (creep) or rapid (landslide, debris avalanche).

Metamorphic Rock - Rock formed from preexisting rocks but changed by heat and/or pressure to rock with new physical, chemical and mineralogical properties.

Microclimate - The climatic condition of a small area modified from the general climatic conditions by local differences in elevation or exposure.

Minimum Harvest Age - The lowest age of a stand to be scheduled for final harvest.

Mixing Height - The height above the ground through which vertical mixing of air is relatively vigorous.

Mortality Salvage - See sanitation/salvage cutting.

Multiple Use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

National Natural Landmark - Areas designated by the Secretary of Interior which contain representative examples of the nation's natural history, including terrestrial communities, aquatic communities, landforms, geological features or habitats of native plant and animal species, possessing national significance in illustrating or interpreting the nation's natural heritage.

National Register of Historic Places - The official list, established by the Historic Preservation Act of 1966, of the Nation's cultural resources worthy of preservation. The Register lists archeological, historic, and architectural properties (i.e., districts, sites, buildings, structures, and objects) nominated for their local, State, or national significance by State and/or Federal agencies and approved by the National Register staff. The Register is maintained by the National Park Service.

Natural Levels - Amount of pollutants present from natural sources without human disturbances which have reached equilibrium.

Non-commercial Forest Land - Land which is not capable of yielding at least 20 cubic feet of wood per acre per year from commercial species, or land which is capable of producing only non-commercial tree species.

Non-degradation Policy - Use of the highest and best practicable treatment and/or control of wastes, activities and flows to maintain water quality at the highest possible levels.

Non-forest Land - Land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

Non-point Source Pollution - Pollution caused by the introduction of materials from diffuse sources (e.g., sediment, nutrients), or from a natural or manmade alteration in the stream system.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

Old-Growth Dependent - An animal species so adapted that it can exist only in old-growth forests.

Operations Inventory - An intensive forest inventory which provides managers with information showing the location, acreage, silvicultural needs, and mortality-salvage or thinning needs within each section of public land.

Outstanding Natural Areas - Areas of outstanding scenic splendor, natural wonder or scientific importance that merit preservation in their natural condition. The preservation of these resources in their natural condition is the primary management objective. Access roads, parking areas and public use facilities are normally located on the fringe of the area. The public is encouraged to walk into the area for recreation purposes wherever feasible.

Paleontology - A science dealing with the life of past geological periods as known from fossil remains.

Partial Cutting - Tree removal other than by clearcutting.

Particulates - Finely divided solid or liquid particles in the air or in an emission; includes dust, smoke fumes, mist, spray and fog.

Peak Flow - The highest amount of stream or river flow occurring in a year or for a single storm event.

Perched Water Table - The surface of a local zone of saturation held above the main body of groundwater by an an impermeable layer or stratum, usually clay, and separated by the main body of ground water by an unsaturated zone.

Permeability (soil) - The quality of a soil horizon that enables water or air to move through it; may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

Personal Income the income received by all individuals in the economy from all sources; made up of wage and salary disbursements, proprietors income, rental income of persons, dividends, personal interest income, and the difference between transfer payments and personal contributions for social insurance.

Phytoplankton - Suspended, floating or weakly swimming microscopic aquatic plants.

Plankton - Organisms of relatively small size, mostly microcscopic, that either have relatively small powers of locomotion or drift in the water subject to the action of waves and currents.

Plant Community - An association of plants of various species found growing together in different areas with similar site characteristics.

Plantation Release - Any action taken on an established commercial timber stand to control stand composition and promote dominance and/or growth of suitable tree species. Treatments may include mechanical or manual slashing of undesirable brush and tree species, herbicide, biological, or a combination of methods. Forest fertilization is not considered a Release treatment.

Plantation Stocking Maintenance - Any vegetation management action taken on an unestablished stand to promote the survival and establishment of suitable trees. Treatments may include using biological, mechanical, or manual weeding, mulching, herbicide or a combination of methods.

Precommercial Thinning - Partial cuttings made in immature stands (10-25 years) in order to stimulate the growth of remaining trees by making available increased soil moisture, thereby increasing total yield from the stand.

Prehistoric - Pertaining to that period of time before written history.

Progeny Site - A test area for evaluating parent seed trees by comparing the performance of their offspring seedlings.

Protection - Any action taken to protect suitable trees from adverse elements such as weather, animals, insects, and disease. Treatments include all practices which increase chances for survival and normal growth of desired tree species.

Public Lands - Any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management. May include public domain, O&C or acquired lands in any combination.

Public Domain Lands - Original holdings of the United States never granted or conveyed to other jurisdictions.

Recharge - Process by which water is added to the zone of saturation, as in recharge of an aquifer.

Recreation Lands - A tract of land usually several thousand acres in size where recreation is or is expected to be a major use, and designation will assist the public by making the area known to them (CFR 43, Part 2070).

Recreation Opportunity Setting - Combination of physical, biological, social, and managerial attributes present on a particular land area which influences the experience obtained by engaging in a specific recreation activity.

Reforestation - Reestablishment of a tree crop on forest land.

Regeneration - The renewal of a commercial tree crop, whether by natural or artificial means; also, the young crop itself.

Regeneration Period - The time it takes for a new commercial timber stand to become stocked following the date of a timber sale.

Regulated Forest - A forest comprised of a desired (usually even) distribution of age classes or tree sizes, when the growth equals the cut (at the highest level sustainable) and when the level of growing stock remains relatively constant.

Relict - A remnant or fragment of a flora that remains from a former period when it was more widely distributed.

Research Natural Areas - Areas established and maintained for research and education. The general public may be excluded or restricted where necessary to protect studies or preserve research natural areas. Lands may have: (1) Typical or unusual faunistic or floristic types, associations, or other biotic phenomena, or (2) characteristic or outstanding geologic, pedologic or aquatic features or processes.

Riparian Habitat (Area or Zone) - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics.

Runoff - That part of precipitation, as well as any other flow contributions, which appears in surface streams, either perennial or intermittent.

Sanitation/Salvage Cutting - Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees likely to die prior to final harvest cut so as to utilize merchantable material.

Sawlog - A log considered suitable in size and quality for producing sawn timber.

Scenic Quality - The degree of visual harmony and variety (high, moderate, and low) within a landscape as compared to other units within the physiographic region.

Scenic Quality Rating Unit (SQRU) - A subdivision of the established landscape within a physiographic province, which exhibits homogenous visual qualities.

Scribner Log Rule - A log rule constructed from diagrams which shows the number of 1-inch boards which can be drawn in a circle representing the small end of a log; assumes a 1/4-inch saw kerf, makes a liberal allowance for slabs, and disregards taper.

Sediment Yield - The quantity of sediment, measured in dry weight or by volume, transported in water flowing through a stream cross-section in a given time. Consists of both suspended sediment and bedload.

Sedimentary Rock - A rock formed from materials deposited from suspension or precipitated from solution and usually more or less consolidated; e.g. sandstone, shale, limestone and conglomerates.

Seldom Seen - Portions of the landscape which are generally not visible from high and medium visual sensitivity level observer positions, and which are visible beyond approximately 15 miles from those positions.

Sensitive Species - Species not yet officially listed but which are undergoing a status review or are proposed for listing according to Federal Register notices published by the Secretary of the Interior or Secretary of Commerce, or according to comparable State documents published by State officials. (Reference Instruction Memo W.O. 80-722)

Sensitivity Level(s) - The degree (high, medium, low) of user interest in scenic quality and concern about possible changes in the landscape features of an area. The two criteria for determining sensitivity levels are user volumes and user attitudes.

Seral Stage - The relatively transitory communities within a sere.

Sere - The whole series of communities which develop in a given situation.

Shelterwood Cutting - A series of partial cuttings designed to establish a new crop of trees under the protection of the old.

Silviculture - The art of producing and tending a forest.

Siphon - A pipe which uses atmospheric pressure to transfer water from one point to another against gravity.

Site Class - A measure of the relative productive capacity of an area for timber or other vegetation.

Site Preparation - Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment which is favorable for survival of suitable trees during the first growing season. This environment can be created by altering ground cover, soil or microsite conditions, using biological, mechanical, or manual clearing, prescribed burning, herbicide or a combination of methods

Slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

Slump - Rotational failure of a discrete block of soil on a failure plane that is curved from top to bottom and from side to side. The block rotates downward and outward along this failure plane while remaining more or less intact.

Snag - A standing dead tree from which the leaves and most of the limbs have fallen.

Soil - The unconsolidated mineral and organic material on the immeditate surface of the earth that serves as a natural medium for the growth of land plants.

Soil Mapping Unit - A combination of soils, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes of the survey; the basis for the delineations of a soil survey map.

Standard Industrial Classification (SIC) - An industrial classification system as defined by the Office of Management and Budget; defines industries in accordance with the composition and structure of the economy and covers the entire field of economic activity. Refer to lumber and wood products for an explanation of SIC 24.

State Historic Preservation Officer (SHPO) - The official within each State, authorized by the State at the request of the Secretary of the Interior, to act as a liaison for purposes of implementing the National Historic Preservation Act of 1966.

Stream Order - A system of stream classification. Each small unbranched tributory is a first-order stream. Two first-order streams join to make a second-order stream. A third order stream has only first and second-order tributaries, and so forth.

Subsurface Flow - Horizontal movement of water through the soil profile.

Succession - The orderly process of plant community change. Process by which one plant community will succeed another over time given the same climatic conditions.

Surplus Inventory - A temporary (1-3 decades) excess of growing stock over and above that which is necessary to sustain the even flow level.

Survival Cover - Cover required by animals to mitigate effects of a period of severe weather that cannot be met by thermal cover. The objective of survival cover is to provide a forest stand structure which will intercept snow during severe storms and provide significant quantities of forage in the same stand. Stand closure should be at least 75 percent o more.

Suspended Sediment - Sediment suspended in a fluid by the upward components of turbulent currents or by colloidal suspension.

Sustained Yield - The yield that a forest can produce continuously at a given intensity of management.

Teratogenicity - Ability of a substance to cause abnormal development of a fetus.

Texture (soil) - The relative proportion of sand, silt and clay (expressed as percentages) in a soil; grouped into standard classes and subclasses in the USDA Soil Survey Manual.

Thermal Cover - Cover used by animals to ameliorate effects of weather. For elk, a stand of conifer trees which are 40 feet or more tall with an average crown closure of 70 percent or more. For deer, cover may include saplings, shrubs or trees at least 5 feet tall with 75 percent crown closure.

Timber Lands - See Forest Land.

Timber Production Base - Acres included in the calculation of the allowable cut (see high intensity forest management lands).

Timber Production Capability Classification (TPCC) - A classification system that identifies the commercial forest and base capable of producing timber on a sustained yield basis.

True Fir - A member of the genus *Abies*, e.g., white fir (*Abies concolor*). Douglas-fir (*Pseudotsuga menziesii*) is not a true fir.

Understory Species - Shade-tolerant plant species which characteristically grow beneath the forest canopy; e.g., blackberry and rhododenron.

Unit Resource Analysis (URA) - A BLM planning document which contains a comprehensive inventory and analysis of the resources within a specified geographic area and an analysis of their potential for development.

Visitor-day - Twelve visitor-hours, which may be aggregated continuously, intermittently or simultaneously by one or more persons. Visitor-days may occur either as recreation visitor-days or as non-recreation visitor-days.

Visual Resource Basic Elements - The four major elements (form, line, color, texture) which determine how the character of a landscape is perceived.

Visual Resources - The land, water, vegetation, animals and other features that are visible on all public lands (scenic values).

Visual Resource Management (VRM) - The planning, design and implementation of management objectives to provide acceptable levels of visual impacts for all BLM resource management activities.

Visual Resource Management Classes - The degree of alteration that is acceptable within the characteristic landscape. Based upon the physical and sociological characteristics of any given homogeneous area and serves as a management objective.

Volatilize - To evaporate; to change from a liquid to a gas.

Water Quality - The combined physical, chemical and biological characteristics of water bodies.

Watershed - The area drained by a given stream.

Wetland or Wetland Habitat - Permanently wet or intermittently flooded areas where the water table (fresh, saline, or brackish) is at, near, or above the soil surface for extended intervals, where hydric wet soil conditions are normally exhibited, and where depths generally do not exceed 2 meters. Vegetation is generally comprised of emergent water-loving forms (hydeophytes) which require at least a periodically saturated soil condition for growth and reproduction. In certain instances, vegetation may be completely lacking.

Yarding - The act or process of conveying logs to a landing.

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INDEX

Index

Page

Criteria (Planning Objectives).....1-1
Habitat Corridors.....1-8
Employment.....1-2, 2-35, 2-36, 2-37, 2-39, 2-40, 2-41, 2-42,
.....2-43, 2-44, 3-45, 3-47, 3-48, 3-49, 3-50, 3-51, 3-56
Erosion.....1-12, 1-18, 1-19, 2-1, 2-9, 3-4, 3-6, 3-9
Fish Habitat.....2-21, 2-22, 3-24
Fishing.....2-24, 3-32, 3-54, 3-56
Forest Structure.....2-16, 2-19, 3-12, 3-13
Genetically Improved Stock.....1-5, 1-10, 1-14, 3-13
Habitat Diversity.....1-8, 2-16, 2-19, 2-20, 3-19, 3-28
Harvest Levels 1-5
Herbicides.....1-5, 1-10, 1-14, 1-15, 1-16, 1-17, 1-19, 1-22, 2-47,
.....3-24, 3-56
Hunting.....2-24, 3-22, 3-54, 3-56
Income.....2-37, 2-38, 2-39, 2-40, 2-41, 2-42, 2-43, 2-44,
.....2-45, 3-49, 3-50, 3-56
National Register of Historic Places.....2-26, 2-27, 3-36, 3-37
National Rivers Inventory.....2-24, 3-32, 3-34
O&C Revenues.....1-1, 2-45, 2-46, 3-51, 3-52, 3-53, 3-54
Particulates.....1-19, 2-2, 3-2, 3-4
Sediment Yield.....1-18, 1-19, 2-9, 3-7, 3-8, 3-11
Threatened and Endangered Species
    Animals.....1-2, 1-11, 2-22, 2-23, 3-27
    Plants.....1-2, 1-11, 2-17, 2-18, 3-15
Visual Resources.....1-4, 1-7, 1-18, 1-19, 2-27
Water Yield.....2-9, 3-8, 3-9
Wilderness.....2-28, 3-37, 3-38, 3-39, 3-40
Wildlife Habitat Alternation.....1-18, 1-19, 2-17, 2-20, 2-21, 3-16,
.....3-17, 3-24

VER'S CARD
62 1981
of Land
Oregon State
m sustained
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COAST RANGE
BASE LINE
WILLAMETTE
CLATSOP CO.
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COLUMBIA CO.
WASHINGTON CO.
YAMHILL CO.
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Neahkahnie Beach
Manzanita
Nehalem
Wheeler
Brighton
Nedonna Beach
Manhattan
Rockaway
Garibaldi
Bayocean
Pacific City
Netarts
Oceanside
Tillamook
Hebo
Salmonberry
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Manning
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Pittsburg
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Sandy
Boring
Gresham
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Amboy
Yacolt Mtn.
Saddle Mtn.
Dixon Mtn.
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Rocky Butte
Mt. Hood
Mt. Adams
Mt. St. Helens
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BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

COLUMBIA SUSTAINED YIELD UNIT

Westside Salem Environmental Impact Statement Area

1981

Figure 1-1A

SCALE

0 1 2 3 4 5 6 Miles

0 1 2 3 4 5 6 7 8 9 10 Kilometers

LEGEND

INTENSIVE FOREST MANAGEMENT LANDS
- O&C Lands BLM
- Public Domain BLM

OTHER BLM ADMINISTERED LANDS

U.S. FOREST SERVICE LANDS

US FISH & WILDLIFE SERVICE LANDS

STATE LANDS

- U.S. Interstate Highway
- U.S. Highway
- State Highway
- Major Routes of Public Use
- All Weather Road
- Seasonal Road
- Trail
- Railroad
- County Boundary
- SYU Boundary
- Recreation Area BLM
- Recreation Area Other
- Mine or Quarry
- Church
- School

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R 8 W
R 7 W
R 6 W
R 5 W
R 4 W
R 3 W
T 6 S
T 7 S
T 8 S
T 9 S
T 10 S
T 11 S
Willamina
Grande Ronde
Valley Jct
Fort Hill
Gold Creek
Hoyer
Midway
Ballston
Broadmead
YAMHILL CO
POLK CO
TILLAMOOK CO
LINCOLN CO
BENTON CO
LINN CO
MARION CO
Otis
Rose Lodge
Roads End
Three Rocks
Wecoma Beach P.O.
Oceanlake
Delake
Nelscott
Taft
Cutler City
Kernville
Salishan
Gleneden Beach
Lincoln Beach
Fishing Rock
Government Point
Depoe Bay
Cape Foulweather
Otter Crest
Gull Rock
Devils Punch Bowl
Otter Rock
Beverly Beach
Moloch Beach
Agate Beach
Yaquina Head
Jumpoff Joe
Nye Beach
Newport
South Beach
Holiday Beach
Fruitvale
Toledo
Elk City
Yaquina
Moody
Oneatta Pt
Winant
Oysterville
Chitwood
Eddyville
Summit
Marvel
Devitt
Nashville
Norton
Burnt Woods
Blodgett
Wren
Harris
Salado
Harlan
Philomath
Noon
Flynn
Corvallis
Tangent
Monmouth
Independence
Dallas
Falls City
Bridgeport
Fern Corner
Kings Valley
Hoskins
Pedee
Ritner
Kapphan
Airlie
Suver
Maple Grove
Luckiamute
Parker
Dawdon Hill
Buena Vista
Helmick Hill
Sidney
Talbot
Dever
Jefferson
Millersburg
Albany
Lewisburg
Grange
Lower Kiger Island
Halsey
Brownsville
Sweet Home
Lebanon
Sodaville
Shedd
Tangent
Stahlbush
Peoria
Harrisburg
Alsea
Monroe
Bellfountain
Blue River
Leaburg
Walterville
Lowell
Oakridge
Dexter
Lorane
Elmira
Veneta
Fox
Eugene
Springfield
Coburg
Junction City
Salem
West Salem
Keizer
Chemawa
Clear Lake
Lincoln
Brunk Corner
Eola
McNary
Hayden Is
Roberts
Salem Heights
Halls Ferry
Rickreall
Derry
Smithfield
Walkers Corner
Dolph Corner
Perryville
McCoy
Bethel
Bethel Heights
Mission
Botton
Twin Hills
Sunnyside
Roseddale
Orville
Jackson
Tyson Pk
Bunker Hill
Askeny Hill
Leln Hills
Barnett Knoll
Steiwer Hill
Looney
Chehalem
Hardscrabble Hill
Knox Butte
Burkhart
Cox
Pleasant Hill
Mt. Pisgah
Ellendale
Dallas
Black Rock
Luckiamute
Falls City
Bridgeport
Fern Corner
Monmouth
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Sidney
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Jefferson
Millersburg
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Kings Valley
Hoskins
Maple Grove
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Parker
Dawdon Hill
Buena Vista
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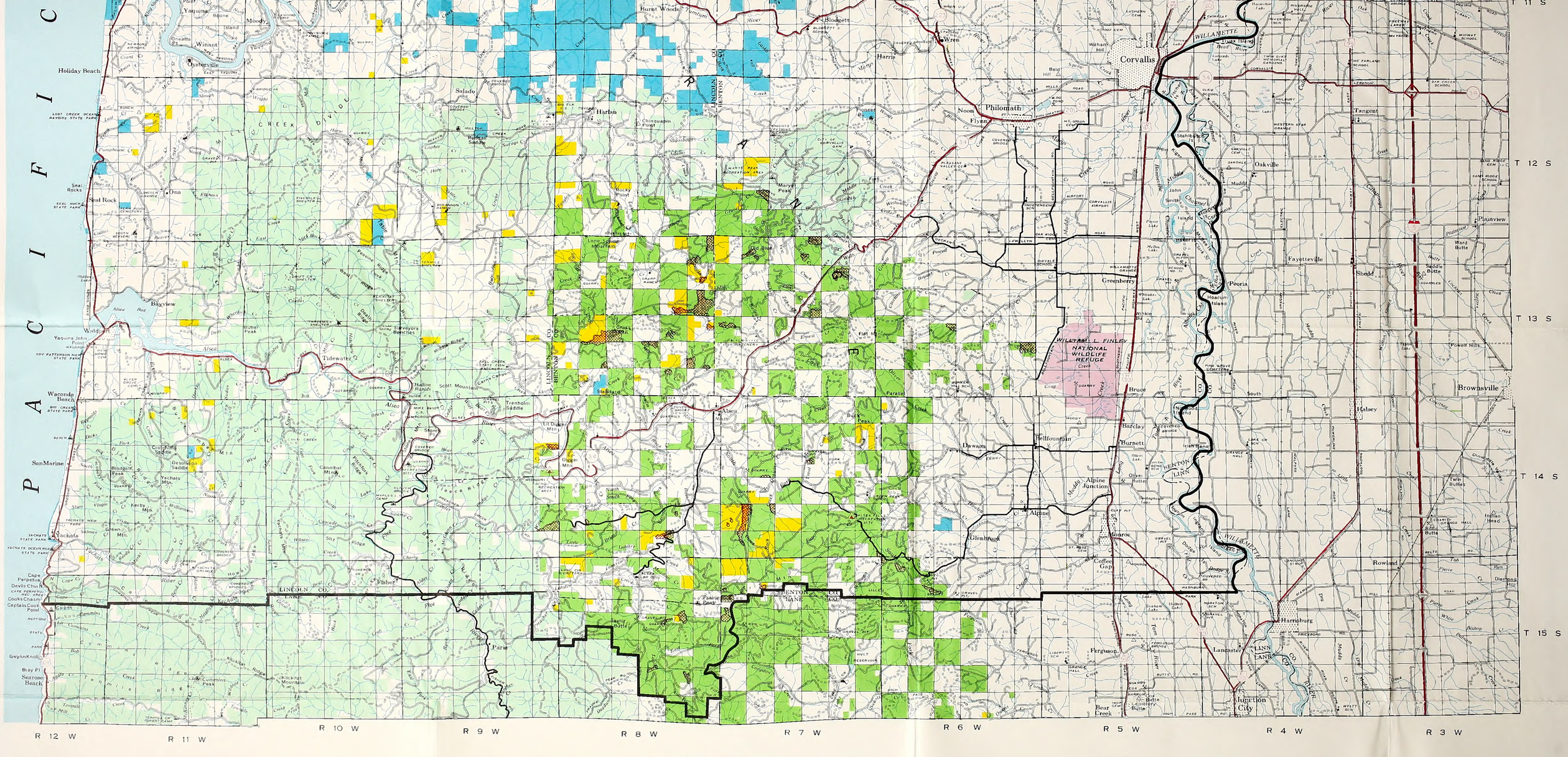
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Corvallis
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Oysterville
Holiday Beach
Seal Rock
Ona
Salado
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Blodgett
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Glenbrook
Coffee Gap
Rowland
Ferguson
Bear Creek
Paris
Fisher
Prairie Peak
Trenholm Saddle
Stone
Scott Mountain
Hollow Hands
Slide Mtn.
Flat Mtn.
Marys Peak
Old Blue
Long Spine Mountain
Rickreall Saddle
Chinquapin Point
Pioneer Bluff
Burnt Woods
Yaquina
Moody
Winant
Waconda Beach
Cape Perpetua
Devils Churn
Cooks Chasm
Captain Cook Point
Gwynn Knoll
Bray Pt.
Seaside Beach
Cummins Peak
Rickitat Mountain
Cannibal Mtn.
Yachats Mtn.
Desolation Saddle
Blodgett Peak
Kelly Mtn.
Green Mtn.
Clothing Saddle
Olsen Mtn.
Fletcher Ridge
Tidewater Ridge
Midway Ridge
Surveyors Benches
Butler Peak
Wilson Ridge
Cascade Ridge
Silver Ridge
Cherry Ridge
Dixon Ridge
Mill Ridge
Tenmile Ridge
Wilson Ridge
Yachats Ridge
Alsea Bay
Yaquina Bay
Siuslaw River
Alsea River
Yaquina River
Willamette River
Marys River
Calapooia River
Luckiamute River
Long Tom River
Muddy Creek
Mill Creek
Oak Creek
Tyee River
Cascade Head
Cape Perpetua
Cape Foulweather
Cape Creek
Cape Cleare
Cape Ferrelo
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